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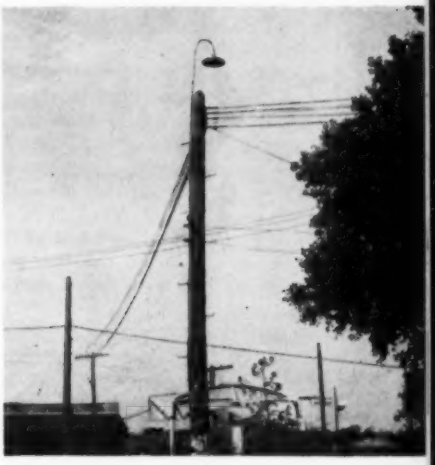
WIRE—An Essential Factor In Telephone Communication

By RAY BLAIN



VARIOUS KINDS and sizes of wire; their use in telephone work. Transmission qualities, strength and cost are determining factors in selection of wire for varying transmission requirements. Installation and connection of bare wire. Types of insulated wire for both inside and outside of buildings

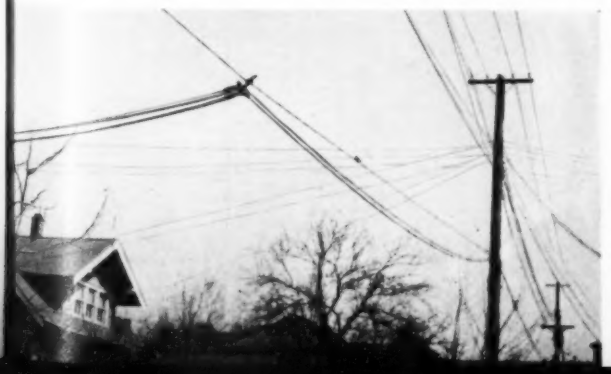
WIRE is one of the highly indispensable and largely used materials for carrying on telephone and telegraph communication. The selection of the correct type of wire, and then its proper installation, is of the utmost importance. The use of the best quality wire obtainable proves the most economical, regardless of its original price, because the longer a wire lasts in service the less its cost.

Hard-drawn copper wire is now used almost exclusively on all long toll lines in this country. Ordinarily under average conditions the use of galvanized iron wire will prove more economical than hard-drawn copper wire for rural line use. The exception to this rule would be on long or special lines where iron wire would not provide a good grade of transmission and where, from necessity, copper wire must be used.

There are, perhaps, cases where the extra long life of copper wire would prove-in economically for rural line use, but with present-day galvanizing methods iron wire has a life so long that this is a debatable point. The new processes of galvanizing wire results in a perfect mechanical bond between the coating and the iron base metal. This insures a protective coating which will not crack or peel, even if the wire is bent or twisted abruptly, as when wrapping around its own diameter.

The smallest copper wire used in an aerial span is known as .080, or No. 14 N.B.S. gauge, which measures .080 inch in diameter. While this small wire gives good transmission over reasonable distances, it does not possess necessary mechanical strength. A burn, even slight, at a tie wire, or a heavy loading of ice, generally means a broken wire and a case of trouble. For ordinary toll line or rural use .104 copper is generally recommended. This is No. 12 N.B.S. gauge and is .104 inch in diameter. This size wire is strong mechanically and seldom causes trouble due to breakdowns except under heavy, abnormal sleet conditions.

Sometimes No. 14 iron wire is used on rural lines. This use is not generally considered good practice, due to the fact that this size does not have sufficient mechanical strength. It was at one time extensively used for exchange open-wire lines and it is still considered good for running lines a few thousand feet from the cable terminal, but it is not now considered desirable for cross-country telephone lines.



Modern method of stringing drop wire is shown above at the right.

Drop wire breaking off a messenger in the center of a span to clear trees.

The iron wire generally recommended for rural line use is .109 iron, which is No. 12 B. W. gauge and .109 inch in diameter. This wire costs but little more than the No. 14 and is certainly better for all general purposes. No. 10 B.W. gauge iron wire, .134 inch in diameter, is sometimes used in heavy sleet areas.

Copperweld wire is extensively used in rural and toll lines and has the advantage of great mechanical strength for its size. The No. 12 A.W.G. (B.&S.) wire has a breaking load in pounds of 520 while that of hard-drawn copper wire is 337. Copperweld wire of 40 per cent conductivity has a resistance of 21.4 ohms per mile at 68° F. and copper wire only 8.56 ohms.

When proper transmission can be obtained, the use of copperweld wire will frequently prove desirable. On long-span river crossings, or on any line where extra strength is desired, use of this wire is especially feasible.

The length of span to use with a certain type of wire is always of utmost importance. When No. 12 iron wire is used in a section of the country where sleet is heavy, a rural line span should not be over 190 feet. Where sleet is extremely light or unknown, 300-foot spans may be safely used if supported by good poles. In sections of the country subjected to extremely high winds, these long spans might not prove desirable. Ordinarily, shorter spans should be used with copper wire than with copperweld or iron wire.

When stringing wire of any kind it is always important that sufficient sag be left in each span. As an example of this, when placing No. 12 copper or iron wire on 190-foot spans at a temperature of 70° F., a minimum sag of about 25 inches should be left in the span. Many think this amount of slack will cause trouble, but such is not the case if all wires are even so they will swing together. When one wire is tighter than the rest, the slack wires will swing farther than the tight ones and may wrap together.

Usually all tie wire should have the same surface material as that of the line wire it is to hold on the insulator. Copper or copperweld ties should be annealed, and iron ties should be made of very soft wire. Ordinarily a No. 12 copper tie wire is about 20 inches in length.

To tie copper wire to the insulator the tie wire is first placed around the insulator, crossed, wrapped in each direction by hand and the ends turned back. When the grade of a line changes suddenly at an insulator, special figure eight ties are generally used. Iron ties are usually of the plain horseshoe variety. We do not like to clip the ends of iron ties either. Ties should always grip both the line wire and the insulator firmly. Loose ties vibrate, burn the line wire and even shatter the insulators.

Good wire should always be placed on good insulators. Practically all insulators of the present day are a good grade of non-porous glass. Porcelain was formerly used to some extent in telephone work but did not always have the necessary insulating qualities during prolonged wet weather.

Pony or exchange line insulators are generally used on rural lines, and the standard toll insulators on long toll lines. The pony insulator weighs about $9\frac{3}{8}$ ounces, the exchange line insulator about $10\frac{3}{8}$ ounces, and the toll line insulator about $14\frac{3}{4}$ ounces. The pony insulator has a dry flashover voltage of about 34,900, the exchange line about 38,600 and the toll about 39,300.

When open wire connects to a cable terminal, bridle wire jumpers are generally used. This wire is twisted pair, generally No. 18 gauge, soft copper, with a rubber braid covering. Due to the fact that bridle wire is not subjected to great strain, small, soft copper wire, which is convenient to handle, can be used.

At the present time the jumper wire is usually connected to the line by means of solderless connectors. Bridle wire insulators are also frequently used to prevent leakage over the end of the insulation where the wire is bared for the connection to the line. These insulators are small, flared glass tubes which slip over the wire before making the connection. The other end of the jumper generally goes through a protector before actually connecting to the cable pair.

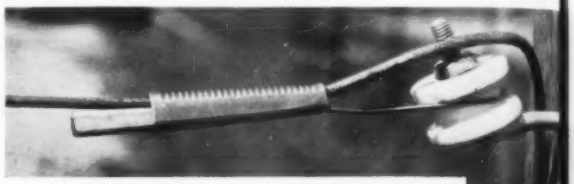
Great improvements have been made in all drop wires during the past few years. Manufacturers have done considerable research work and have improved the quality of drop wire greatly. Three highly-accelerated tests have been used to prove the resistance of rubber insulation to the destructive effects of oxygen and pressure. The following tests or modifications of them are often used in the development and improvement of drop wire:

Air oven—five days' (120 hours) aging in an air oven at a temperature of 121 degrees Cent. (250° F.).

Air-bomb test—80 lbs. per square inch air pressure at a temperature of 127 degrees Cent. (260° F.) for a period of 20 hours.

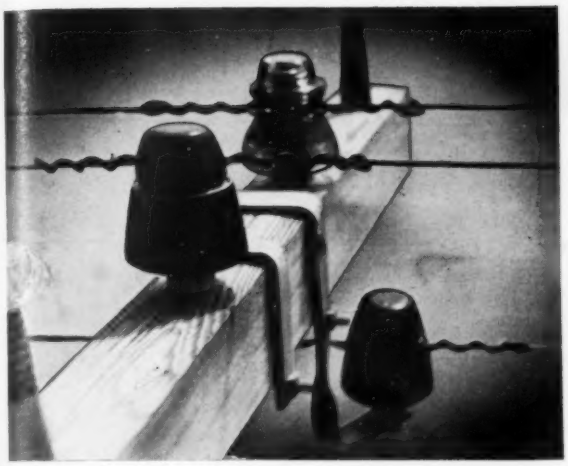
Bier-Davis oxygen bomb test. In this test pure oxygen is used under a pressure of 300 lbs. per square inch at a temperature of 70 degrees Cent. (158° F.) for a period of 21 days (504 hours).

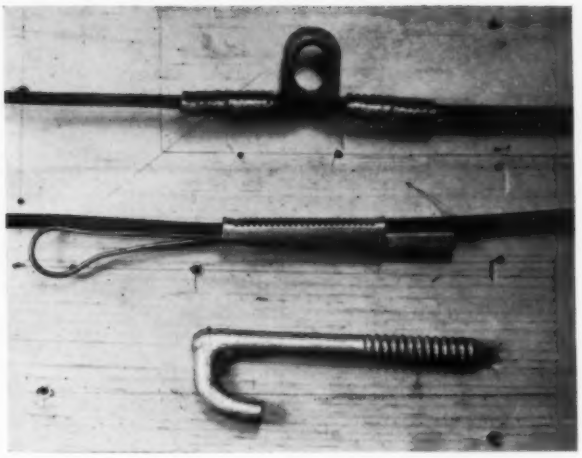
It must be admitted that wire which can stand up under even one



Drop wire clamp being supported on a knob fixture.

To the left is an iron tie wire of the common horseshoe variety. The others are copper tie wires.





The proper method of making ties in copper wire. Illustration to right shows (at top) the drop wire clip used to replace intermediate ties on drop wire. In the center is shown a dead-end clamp and at the bottom a drive hook used for drop wire supports.

of these tests will undoubtedly give years of good service in the line.

Parallel drop wire is generally used at the present time although some still prefer twisted-pair wire which does give good service. No. 17 or 18 gauge drop wire is now almost universally used. It is ordinarily of either bronze or copperweld.

Some may not be entirely familiar with the present-day type of iron drop wire. This wire may be obtained in either No. 18 or 19 B. W. G. gauge, in twisted pair or parallel. The conductors are of pure BB grade iron, accurately annealed to provide great tensile strength, high conductivity and great flexibility.

The wire has a heavy uniform coating of pure zinc applied by an approved process of galvanizing. The insulation has a 30 per cent pure para compound to provide extra long life and toughness. A braid covering of two-ply long-fibre cotton is given the mica finish.

In the old days drop wire was generally No. 14 gauge twisted pair copper but this is too heavy and expensive for ordinary use today. It is, however, still used to some extent on toll lines leading into exchanges. In some localities, No. 16 copper drop wire was used extensively. This wire may still be obtained and is used occasionally on toll lines.

Weatherproof insulated iron wire is often called "Tree Wire" because it is used extensively on lines through trees to keep them free of leakage in wet weather. This is BB, double-galvanized wire, generally of No. 14 or 16 BWG gauge. This braid has the pitch and mica finish. This wire can be obtained in either the double or triple braid. Numerous types of tree wire in either copper or copperweld may be obtained and can often be used to good advantage in the line.

Good drop wire is frequently dam-

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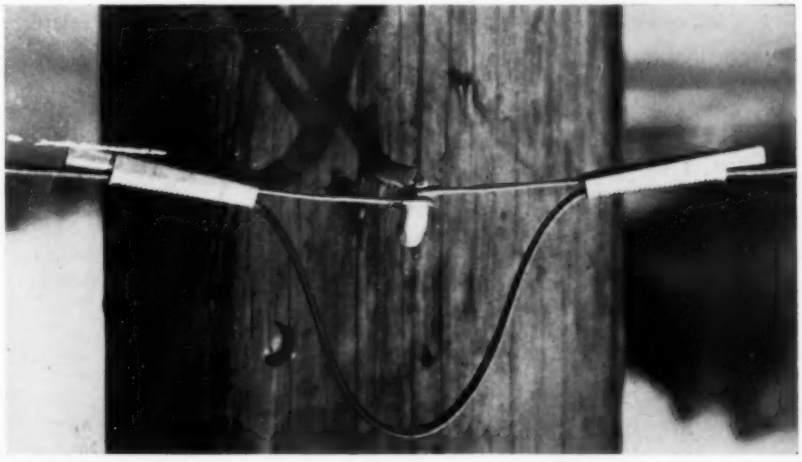
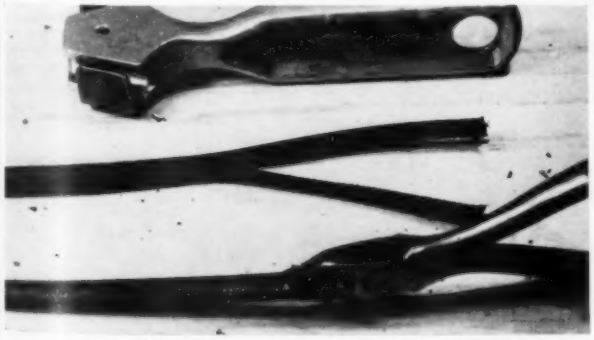
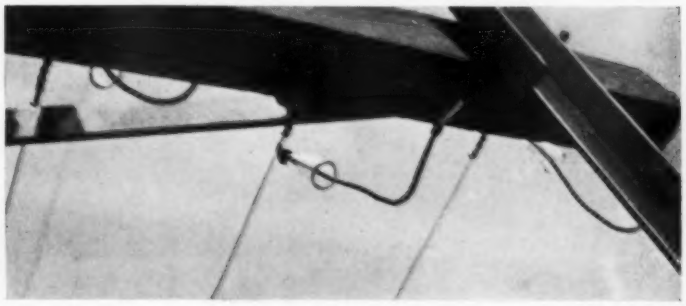
Two dead-end clamps used to turn a right-angle corner with drop wire.



The braid stripper and a piece of parallel wire which has been stripped with it. The illustration also shows how diagonal pliers may be used to split parallel drop wire.



A bridle wire insulator is shown below.



POLES have ever been and perhaps for years to come will continue to be one of the principal items of material used in the telephone industry—despite the fact that much outside plant is now being placed in underground conduit. In many sections of the country aerial construction will no doubt prove more economical and practical for a greater part of the telephone plant.

In the early days, pole-setting was generally accomplished by large construction crews, with the pike pole and jenny method as the only aid to sheer brute strength. These old-time crews actually had pole-setting down to a science. It was a real pleasure to watch them in action and note the comparative ease with which they handled and set poles, even the heavy ones.

Every man knew his job—just what was expected of him—and at no time was he found lacking.

Times, however, have changed; and machinery and economic pressure have greatly reduced the size of the average construction crew. In contrast to the old-time crew, which often contained as many as 20 men, a construction crew now averages about five men. The workmen of today ride in a well-equipped construction truck to the scene of their day's labor.

A crew of five men is not ordinarily sufficient to properly set a heavy pole by the pike method. This is seldom necessary, though, as the modern construction truck is generally equipped with a power winch and pole derrick. The pole derrick makes the erection of poles up to 50 feet in length a relatively simple task. In fact, a pole as high as 60 feet can generally be set with the larger size pole derrick.

The erection and handling of poles longer than 60 feet generally causes an increase in gray hairs for the construction foreman. This is a comparatively simple task, however, when the proper methods and equipment are used.

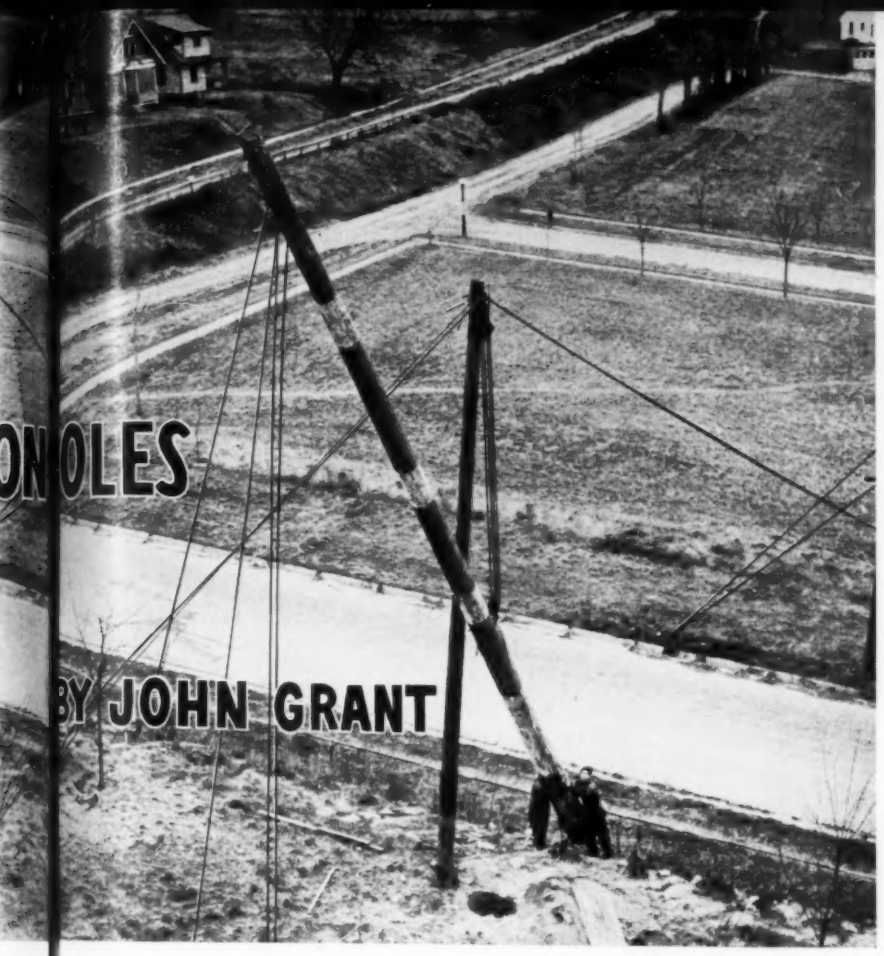
Some claim it is unnecessary to use poles longer than 50 feet in modern telephone work. Generally speaking, this is true, although higher poles are still in use in some sections of the country and occasionally one or more of them must be replaced. For this reason it seems desirable to consider the pole-setting problem from all angles and to be prepared to meet any condition that may be encountered.

A certain radio concern that makes use of numerous 90-foot wooden poles to support its high frequency antennas, recently stated that in many sections of the country it has a most difficult time in locating contractors willing to erect these poles; also that the majority of the telephone and power companies flatly refuse to attempt this work.

Frequently, the radio company is obliged to transport a contractor and his equipment a distance of several hundred miles, at great expense, to erect a single 90-foot pole. One large telephone company recently could not furnish a lineman to install a standard 10-pin crossarm on top of a 90-foot pole after it had been set.

This would seem to indicate that both pole-setting and line work are becoming a lost art, but this we refuse to believe. We know for certain that there are numerous good construction men and linemen in all sections of the country who would not fear a 90-foot pole in the slightest. Numerous other good construction men might hesitate to attempt the erection of a high pole, due to the lack of accurate information as to just how the attack should be made.

The primary purpose of this article will be to help such men, but we shall attempt to go a step farther



ON OLES

BY JOHN GRANT

and cover the complete subject of pole-setting in detail and from all angles.

We shall consider in turn three different methods of pole setting: the pike pole, the pole derrick, and the gin pole. The "bull rope" method, which is really a modification of the gin pole method, will also be described as it proves especially desirable in some cases when suitable other equipment is not available. We shall also attempt to show the ease and safety with which poles of any size and length may be erected when proper equipment and methods are advantageously used.

The Pike Pole Method

Many telephone companies continue to set poles up to 35 or 40 feet in length by the pike pole method. Although the method is comparatively safe if proper precautions are observed, I once saw a man killed while using it. Good pike poles should be used; and it is important to keep them sanded down and finished with spar varnish at all times to prevent splinters.

When the pole to be erected is placed at the hole, a digging bar or plank should be placed in the hole for the pole butt to ride against as it slides into the hole. If this is not done, the butt will dig into the earth and the pole is likely to kick out before it finally slides into place in the hole.

The jenny should be placed in position to take the pole when it has been elevated sufficiently. Pike poles should also be conveniently placed so that they may be easily located when required. Two cant hooks should be placed on the pole about two feet above the probable ground line, one pulling against the other to prevent the pole turning as it is raised, kicking the pike poles out and possibly rolling off the jenny.

When the pole has been elevated so that the top rests on the jenny, the short pikes may be used to help lift. One man should be assigned to the jenny to move it toward the butt as the pole is elevated. The pikes should be placed on either side of the pole, one pushing slightly against the other to keep the pole balanced as it rises.

One pike may be placed directly in the center, to lift only, on smaller poles when three pikes are sufficient to raise it. On larger poles a greater number of pikes is required, but an equal number should always be assigned to each side to maintain a good balance at all times.

When the pole is allowed to rest on the jenny, one set of pikes should steady it while the others take a new bite. They in turn can steady the load while the remaining pikes move down the pole. The man handling the cant hooks should make sure that the butt slides down the bar as the pole elevates. As the pole nears a vertical position, the pikes should spread so as to keep it in a vertical position as it drops into the hole.

When starting to raise a pole, the pike handlers ordinarily should keep the end of the pike pole in the palm of one hand while they guide it with the other. After the pole has been elevated a sufficient distance, they may be able to exert a greater pressure by placing the end of the pike on one shoulder and guiding it with the hands.

After the pole drops into the hole the bar should be removed and the pole canted into position. The pikes, or at least four of them, should be grounded to hold the pole while the earth is being tamped in around it.

Erecting poles by the pike pole and jenny method. Three pike poles were sufficient for this size pole. Considerable labor is saved by installing crossarms before the poles are set.

Locating the proper point on a pole for attaching the winch line, prior to erecting by the derrick method.

View to left shows a 60-ft. pole raised to the limit of the derrick with the butt of the pole on the hole.

Illustration below shows the next step, slowly backing the truck to erect the pole and lower it into the hole.

There is no doubt that the pole derrick is the most convenient and satisfactory method of setting poles. Every telephone company charged with any pole setting should have a line construction truck equipped with a power winch and pole derrick; certainly there is no one piece of equipment which produces greater benefit for the cost.

The Pole Derrick Method

The pole derrick method of pole setting is considered so simple that it will be only briefly described. If the pole is especially heavy, the supporting jacks on the rear of the truck body should be used. These jacks carry the load and relieve the springs and tires of the truck.

Care should be taken to make the hitch for the winch line so that it will be low enough to permit the pole being raised to a sufficient height for lowering into the hole. The butt should also be slightly heavier than the section of the pole above the hitch. It may be necessary to give the pole a few test lifts of a few feet off the grond in a horizontal position to locate this point accurately.

Often poles higher than the ordinary capacity of the derrick, and up to about 60 feet for the larger size derrick, may be raised by employing a few simple kinks. First attach the winch line as close to the butt of the pole as possible, without having too much weight on the top section. When lifted off the ground in a horizontal position, the pole should be near a balance on the winch line.

Place the truck the necessary distance from the hole, usually about 15 feet, and the butt of the pole in position over the hole. It may be necessary to trench the hole slightly, for that always makes the setting of poles in this manner somewhat easier. Then raise the pole to the limit of the derrick.

After placing a bar in the hole for the butt to slide on, back the truck slowly until the pole drops into the hole. It may be necessary to slacken the winch line a few feet to accomplish this. Pike poles may now be used to properly line the pole and hold it for tamping.

The Gin Pole Method

When a pole derrick is not available, and when extra heavy or extra long poles are to be erected, the gin pole method may be used to advantage. The gin pole should usually be at least half the length of the pole being set. It should be located with the butt near the hole for the line pole. If there is danger of the butt of the gin pole slipping, a small hole about six inches deep

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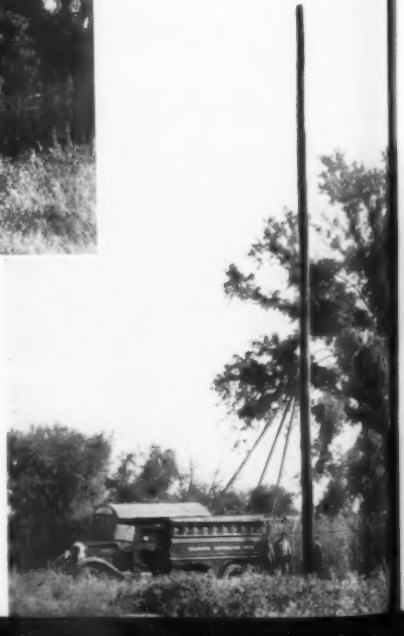
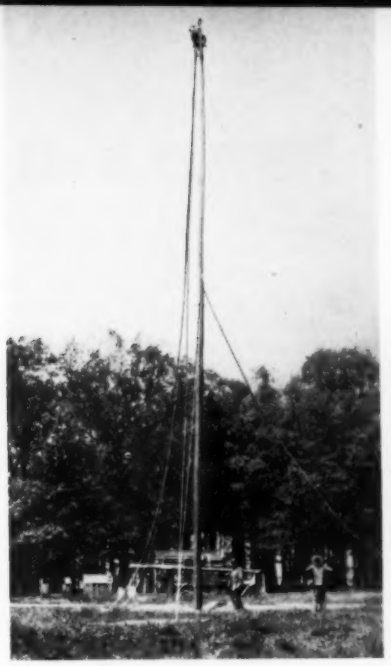
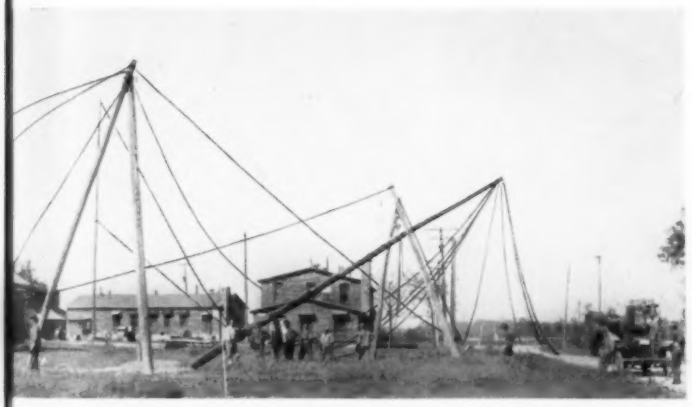
View below shows the pole set vertical and in the hole, ready for aligning preparatory to tamping in.



Rigging set, ready to erect pole by the bull rope method. The top end of the pole is to be lifted from a flat position on the ground between the fixture at the right.



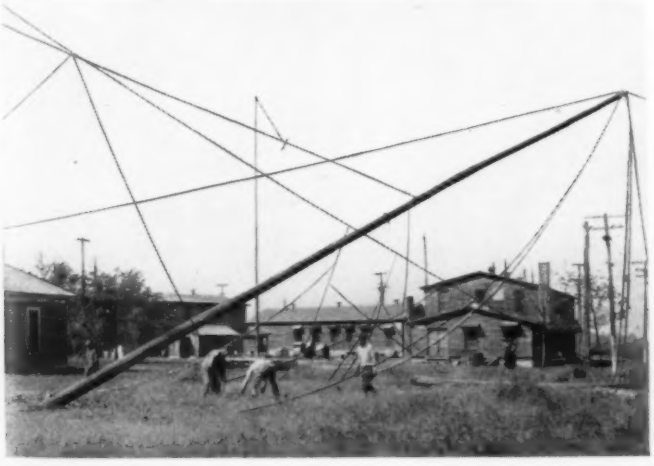
The job completed; the pole set and tamped in and a good lineman at the top. →



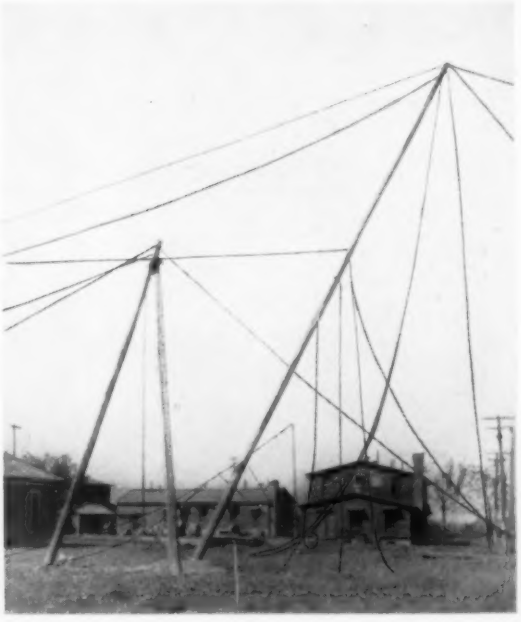
The first lift by the bull rope method. The strain was then placed on the bull rope over the poles in the foreground and the ones which straddle the pole were removed.

The strain is now on the bull rope which carries the weight of the pole and the poles which straddle the main pole are being removed.

The 90-ft. pole is now on the bull rope and going up as shown below. Side guys hold the pole straight into the pull. ↓



The pole is in the hole and nearing a vertical position. The guy ropes are now being used to steady the pole. →



Aerial Toll Lead Put Under River Bed

DURING the spring floods of last year the Pacific Telephone & Telegraph Co.'s toll lead between San Francisco and Los Angeles, Calif., was washed out at the Kern River crossing in Bakersfield, Calif. To eliminate the possibility of a recurrence of such an interruption to service on this important toll route, the company made arrangements to replace the aerial lead at that point with a 2,000-ft. submarine cable containing 131 quads and six radio pairs.

The work was commenced late last year and completed and cut into service early this year. The project was under the direction of W. S. Miller, supervising construction foreman of the Pacific company, the cable-placing crew being in charge of Oscar Ogilvie. While the laying of the submarine cable did not present any spectacular problems, it was quite an undertaking. Several annoying obstacles had to be overcome, one of which consisted in going through the canal levee without damaging or weakening it in any way.

The project involved the placing of 2,000 feet of armored submarine cable. The cable was protected by tightly-wrapped creosoted jute, covered with a special galvanized, extra heavy wire wound around the cable in a spiral fashion, with another over-all covering of jute.

The cable was buried four feet deep in the river channel and canal bottoms and to a depth of three feet elsewhere. Two toll load pots were buried to a depth of four feet, resting on and covered by fully creosoted four-by-four foot planks. All buried splices were protected in the same manner.

Haviside BBB galvanized anchor chains (¾-inch chains) were attached to cable clamps at either side of the buried splices, pulled taut to give added strength to the splices. The armor was welded across the finished splices. A trench four feet deep and from four to six feet wide was dug by means of a gasoline-powered drag shovel.

The photographs reproduced on this page show practically the entire route of the cable from the south manhole to the manhole on the north bank of the Kern River crossing, a distance of approximately 2,000 feet.

The rest of the story is told in the captions accompanying illustrations of interesting parts of the work on this and the following page.

The dead-end pole where the present aerial cable goes underground on the south bank of the Kern River basin.

View of the irrigation canal of the Kern County Land Co. showing the cable loading pots mounted on an "H" structure in the left center background.

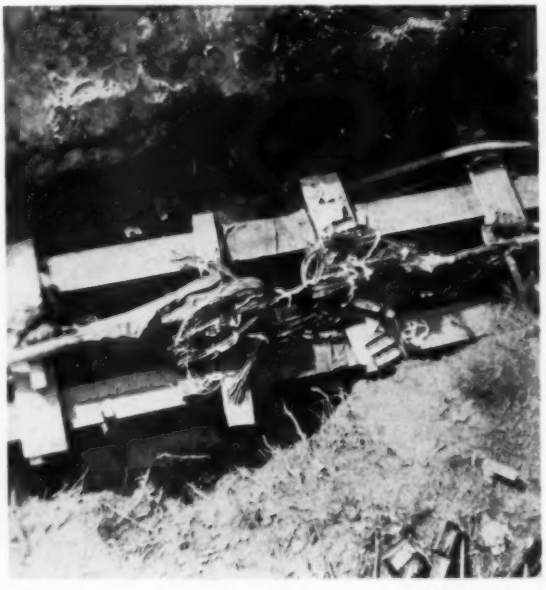
Approaching the north bank irrigation canal; note trestle of Southern Pacific Railroad in the left background.

View showing a water-filled trench, water having been struck at a depth of one and one-half feet. The "A" structures were erected while the river was on a rampage last spring. The water rose to a point only a few inches below the cable.

View of trench showing the cable lying on the ground in the right foreground.

In this particular location of the river channel the river attains its greatest depth. Note the sag in the cable at this point. "A" structures were guyed to the Southern Pacific Railroad trestle seen in the right background of this picture.

This reel contains 1,232 feet of armor-protected jute-wrapped submarine cable and weighs 12 tons. Center view was taken at lowest point in sag shown in another illustration. It gives an idea of clearance from river bottom to aerial cable which was replaced by the submarine cable. Man shown is 5 ft. 9 ins. tall. To the right above is another view of the 12-ton reel of submarine cable.



The set-up as load pots were being spliced into the cable; the Humdinger power pump is seen near the center. It was necessary to keep the pump in operation constantly in order to keep the water below work level. To the right is a close-up aerial view of the set-up in the illustration to the left for splicing loading coils into submarine cable in the Kern River bed.

Cable Splicer Earl C. Sutherlin (left) and Splicer Robert A. Lowery, who handled the cut-over. To the right (below) is a "long shot" view of the aerial loading pots, showing the hole in which the new submarine cable loading coil pots were set.

An Ounce Of Precaution Will Prevent Many an Injury

By ROBERT DeVORE

BE ON THE LOOKOUT for "accidents going somewhere to happen". Many of them can be warded off by a little precaution — and a little less haste. Some common hazards in telephone work that need special watching

JUST the other day on the street I overheard someone remark that his neighbor looked "like an accident going somewhere to happen." Well, I don't know his neighbor but that expression struck me peculiarly. While we all have seen accidents after their occurrence, it might be interesting to see one "on its way to happen." So with the aid of some specially-posed photographs, we shall try to show them as they appeared tc us.

Almost every morning, unless a company has night garage service, the truck drivers will check the air pressure in their tires. Most of the larger trucks use high-pressure rear tires, and they carry from 75 to 110 pounds pressure. Have you ever seen one of these casings, weighing 100 pounds or more, tear itself off the wheel and hit the man kneeling beside it? "They certainly go places!"

One illustration on this page shows a driver in a very good position to catch a casing that might blow off; in another, he is shown wisely placing the heavy fender between himself and danger.

There's another accident waiting at the other end of the truck—when you run a little low on water and you come into the filling station to refill. Imprisoned steam and hot water is all ready to give one a very sudden and very painful bath when the radiator cap is removed.

Such an accident can be avoided by sprinkling cold water over the front of the radiator in order to lower the temperature below the boiling point before removing the cap. When the radiator cap is too hot for bare hands, watch out for steam! Every hot day people are seen taking a chance like this.

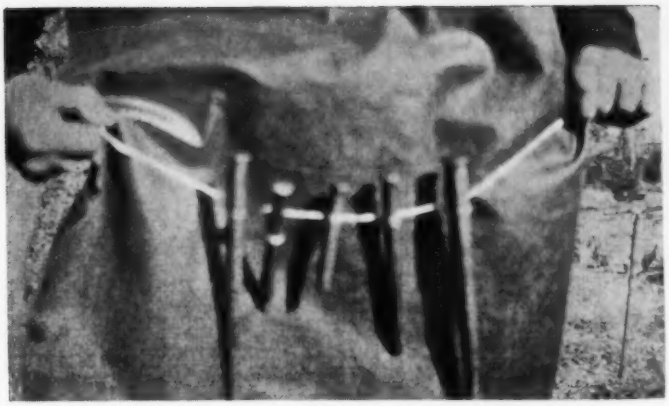
And speaking of hot days (they even creep up on us in April and May) there is that dangerous habit of drinking ice water when you are overheated. Of course, most companies rule against ice in the water jug—and it's a common sense precaution. Nothing could be more harmful than to suddenly lower the internal temperature with iced drinks in extremely hot weather. The time will come when all public utility trucks will be equipped with vending machines containing salt tablets which help restore the salt lost through perspiration.

To return to the truck situation: at the rear end are provided heavy steps to facilitate climbing in and out

Truck driver wisely placing the heavy fender between himself and possible danger.

Thoughtless driver in a very good position to catch a vicious blow from the casing.

"One belt which is fully two inches wide and carries standard tested snaps, may be compared with others of varying widths and thicknesses which are equipped with unsafe hardware."



"In selecting a chisel be sure to avoid using one like those pictured. Ends of steel, flying off the mushroomed chisel heads, inflict painful and dangerous wounds. A blacksmith can make worn heads like new in a jiffy."

of the truck; but a rope or chain, lying on the floor and dangling down over the steps, can throw you just as quickly as a professional wrestler and just as effectively. Good "housekeeping" will prevent this easily.

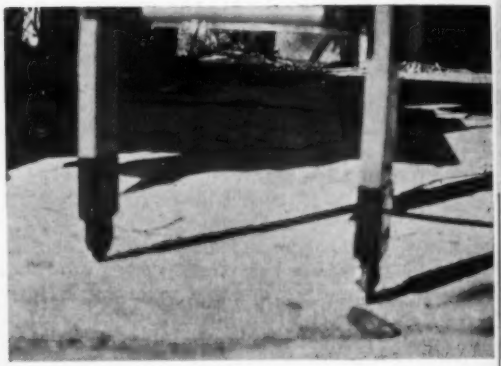
Can you imagine a lineman wearing hooks and a belt on a ladder? Well, this one did. He had occasion to use a ladder to put "just one knob" on a house and didn't want to take time to take off his climbers. When

(*Please turn to page* 47)

The improper use of a lineman's safety belt has caused many an accident.

This lineman used a ladder to put "just one knob" on a house, without removing his climbers. He slipped—as might have been expected—and received a bruise on his leg from the gaff which took a long time to heal.

The metal claws on a ladder will wear out and when that happens, one is apt to be given a ride on slippery pavement. Arranged in a wheel form, these claws may be turned four successive times to present a fresh, gripping surface.



And dont forget the flag protection for the ladder for cautioning passing motorists.

"The carelessly dangling handline—wonder what's going to happen 'upstairs' when the line jerks? It's an easy matter to tie it up safely—out of the way."

Cable Sheath Repairs Can Be Easily Made

By RAY BLAIN

THE LEAD-BURNING or arc-welding method of closing openings in lead cable sheath used successfully in making general cable repairs. Description of equipment required for this work and outline of methods of making various types of repairs in cable sheath and avoiding wiped joints

There has recently been developed a method of cable repair which utilizes the lead burning or arc-welding method to close various types of openings in the lead sheath of cable.

WHEN a case of cable trouble has been definitely located, the next thing in order is to clear it with the least possible delay and to make permanent repairs. The old-time method, and one more familiar to the majority of us is to utilize a chipping knife and hammer and remove a section of the lead sheath at the fault.

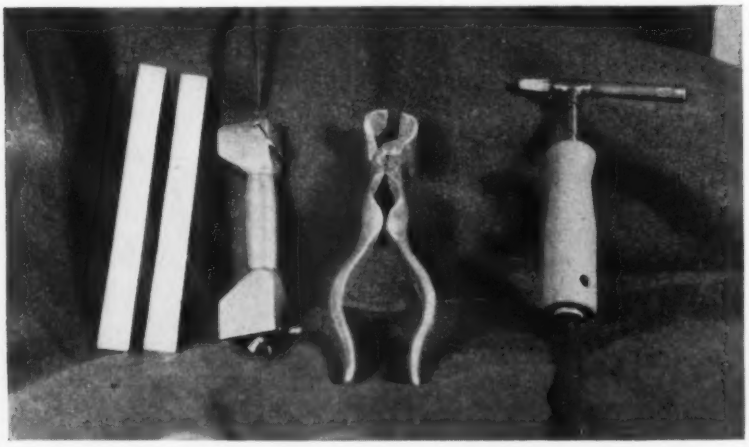
If the trouble is located in a splice, the sleeve is removed, the cable boiled-out with hot paraffin and a new, and probably longer sleeve wiped in place. This method naturally requires the services of a trained cable splicer which are not always available to many of the smaller telephone companies.

There has recently been developed a method of cable repair which utilizes the lead burning or arc-welding method to close openings in the lead sheath instead of wiping on heated metal. This method does not necessarily require the services of an experienced cable splicer, for a trouble-shooter or lineman, if given a few hours of special instruction, can be qualified to make all ordinary cable repairs in the average small telephone exchange.

Neither need this method be confined to the smaller exchange nor to the small cables in the large exchange, for its use can be general. An attempt will be made to explain how this new method has been successfully utilized in making general cable repairs in several exchanges.

Power for the arc-welder used in lead-burning repairs to cable is supplied by a six-volt storage battery for the sake of portability. We make use of a 150-ampere-hour truck battery although a 90-ampere-hour automobile battery will satisfactorily meet all ordinary requirements. The average telephone company could economically rent batteries for this work. The arc-welding tool itself is an insulated handle, arranged with a clamp to hold a 3/8th-inch carbon rod and has a heavy flexible copper wire attached.

To operate the arc the end of the wire from the welder is attached to one terminal of the storage battery.



Special tools for use in arc-welding or lead-burning method of cable repair.

A second wire connects the other terminal of the storage battery to the cable on which repairs are to be made. When working on an aerial cable of average height the wire leads should always be long enough to reach the battery on the ground.

When the carbon point is placed on the cable, the circuit is closed and the arc heats, melting the lead. A little practice will soon indicate how the arc should be handled to build up the metal and properly close an opening in the cable sheath.

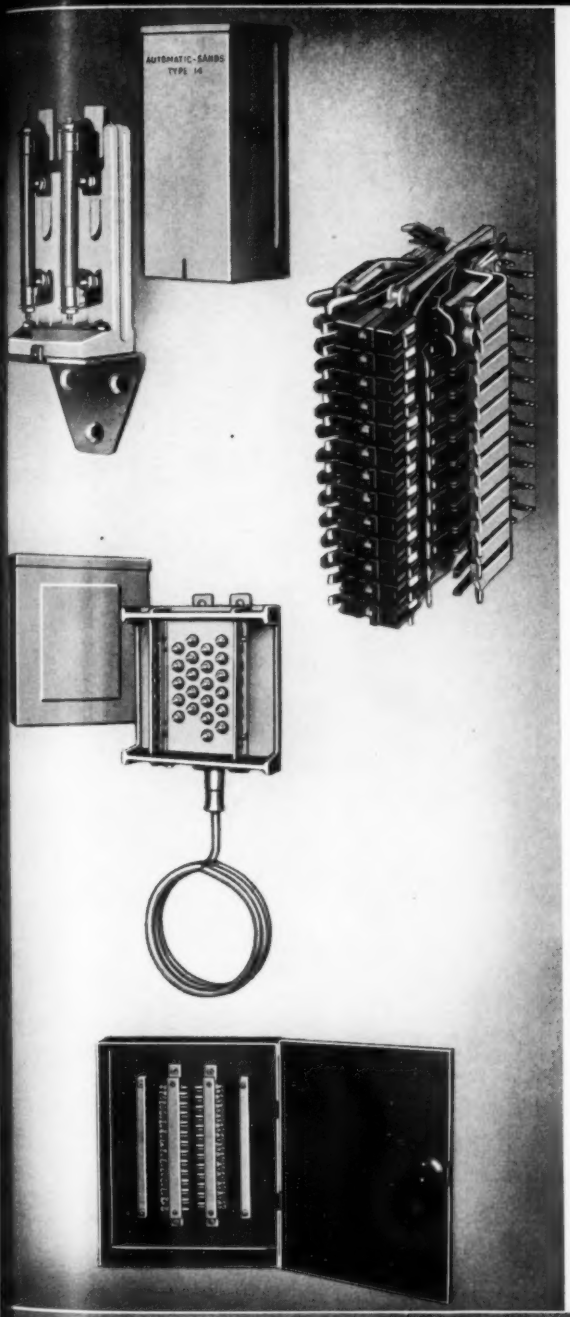
With this method of cable repair the regulation platform is not necessary as a man can use the arc at a pole by utilizing a belt and safety, or he can work from a cable car or a ladder. This saves considerable work and time when making small repairs, such as ordinary ring cuts.

To repair small sheath openings, such as bullet holes or cracks, the cable can generally be slit for a few inches and opened so that the moisture can be boiled-out and repairs made without the need of a lead sleeve. The sheath should be slit the distance necessary to clear the trouble. A special tool is available which makes the proper opening of the sheath a simple matter and does a much neater job than is possible with a chipping knife and hammer.

This tool has a sharp cutting adjustable point which is mounted in a V-shaped block that fits cable of all sizes. The sheath of the cable at the point where the cut is to be made should first be straightened and then well lubricated with stearine or tallow. The V-shaped slot of the tool

(*Continued on page* 32)

Sands Protection Equipment



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THE TYPE 676 CENTRAL OFFICE PROTECTOR

This heat coil and carbon block central office protector provides complete protection against sneak currents, lightning and direct crosses with supply circuits. The heat coil operates quickly, requires no resoldering and can be used repeatedly.

THE TYPE 60 UNPROTECTED CABLE TERMINAL

A light-weight unprotected cable terminal with reversible hood, enabling the cable to be carried out of either the top or the bottom, as desired. Made of heavily galvanized iron, with thick zinc hood fitted snugly to the box.

THE TYPE 75 BUILDING TERMINAL

Terminal strips are equipped with screw binding posts for distributing wires and soldering terminals for cable wires. Mounted in standard boxes with knockouts provided at top and bottom.

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(*Continued from page* 28)

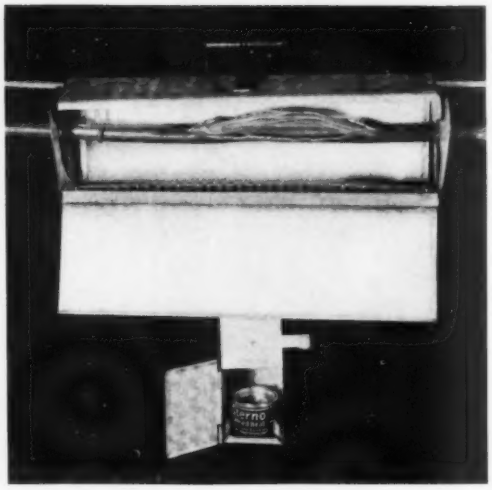
should be held firmly on the cable and pulled along it the distance the sheath is to be opened.

The sharp point should be adjusted so as to cut a small groove in the sheath. This groove should be lubricated by a wipe of stearine after each new and deeper cut. The worker should proceed with caution on this job and not attempt to make too deep a cut at one time for, if this is done, the sharp cutting point may jump out of the groove. By making small, even cuts the sheath will be split in much less time than with deep cuts.

When paper shows in the bottom of the cut, the sheath should be opened with a special tool somewhat like a pair of large lineman's pliers or tongs. The jaw on one side of this tool is blunt and the other fairly sharp. The blunt side should be placed against the cable and the sharp side in the split, and the tool rocked gently to open the split.

The seam should first be worked out carefully from each side before it is spread the full amount. This operation should be carefully done so as to keep the edges of the sheath straight and not cause it to break or buckle. On large cables it may be necessary to make cross-cuts at each end of the slit to get the conductors out in the clear sufficiently to correct the trouble. These cross-cuts can be conveniently made with a small round file.

After the cable has been opened sufficiently, wooden strips should be placed between the sheath and the conductors at each end of the slit so that the outer paper covering can be removed. This will expose the insulation of the conductors and facilitate boiling-out of the moisture.

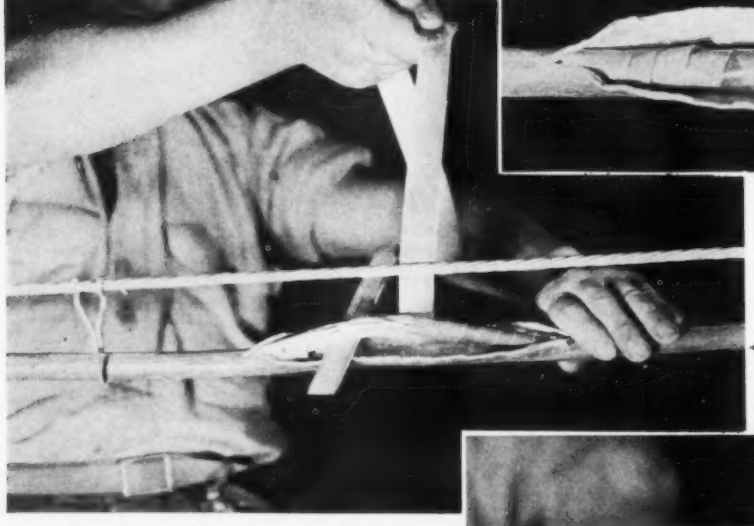


The boiling-out may be done in the old way with paraffin or by evaporation, making use of a special oven. The oven surrounds both the messenger and the cable and the heat is applied from the bottom.

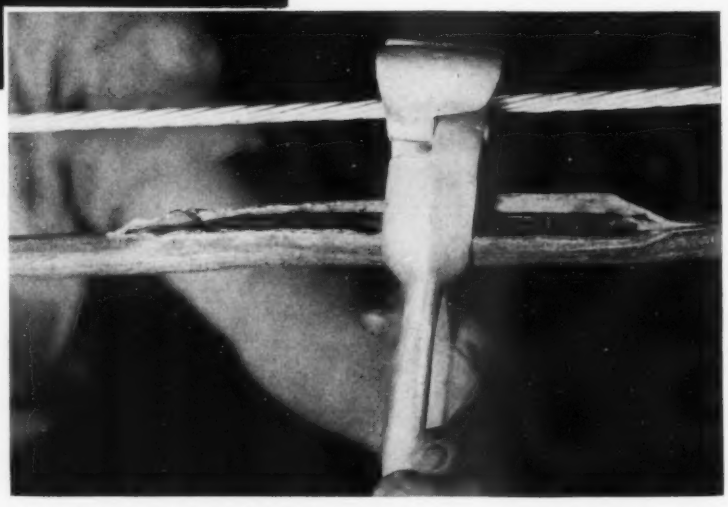
The boiling-out may be done in the old way with paraffin or by evaporation making use of a special oven. This oven is constructed of galvanized iron, insulated on the inside with asbestos and warmed with "canned" heat. The oven surrounds both the messenger and cable and the heat is applied from the bottom.

This idea did not appeal to us at the start, but a trial really proved that it could do the job. The heat from the bottom rises and escapes along the cable at the ends of the oven and carries the moisture from the wet spot with it in the form of vapor. If the wet spot is comparatively long, it may be necessary to

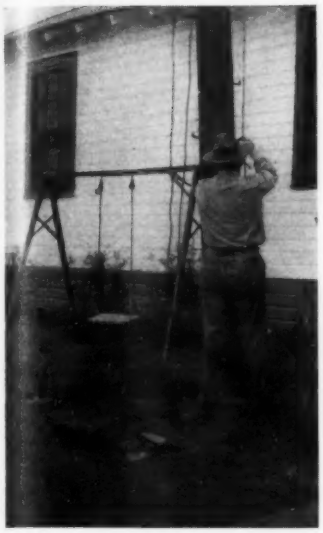
The tape should be pulled tight and the ends tucked well under the sheath with a blunt instrument, as shown above.



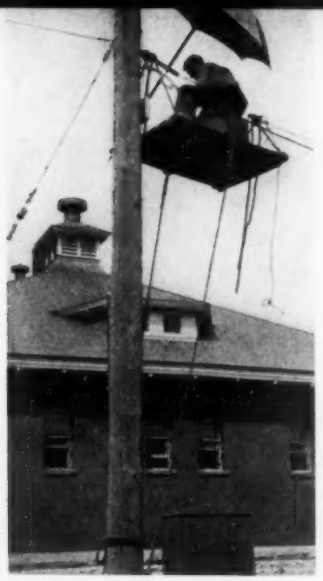
When all conductors have been repaired, they should be wrapped with a cotton tape about one inch wide, as shown in view to left.



At the start of the lead forming to close a sheath opening, it may be necessary to use a pair of ordinary lineman's pliers and then finish off with the special forming tool.



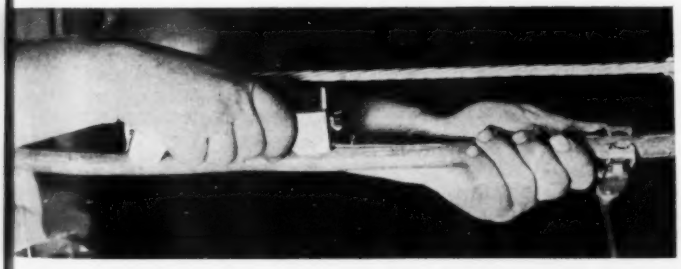
Power for the arc-welder used in lead burning is supplied by a six-volt storage battery, as shown above.



The wiping of cable joints naturally requires the services of a trained cable splicer which are not available to many small telephone companies.

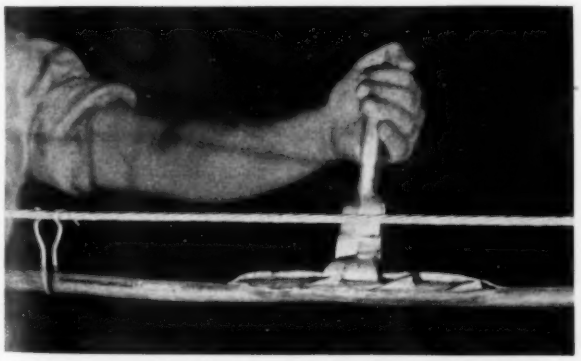
With this method of cable repair the regular platform is not necessary, as a man can use the arc-welder at a pole by using a safety belt, as shown above.

On large cables it may be necessary to make cross-cuts at each end of slit to get conductors out in the clear sufficiently to correct the trouble, as shown to right.

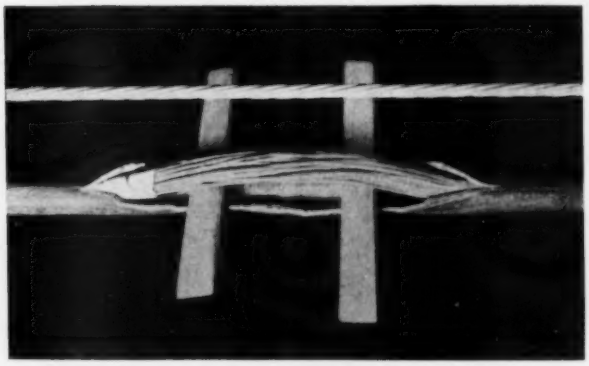


A special tool is available which makes the proper opening of the cable sheath, at the point of trouble, a simple matter.

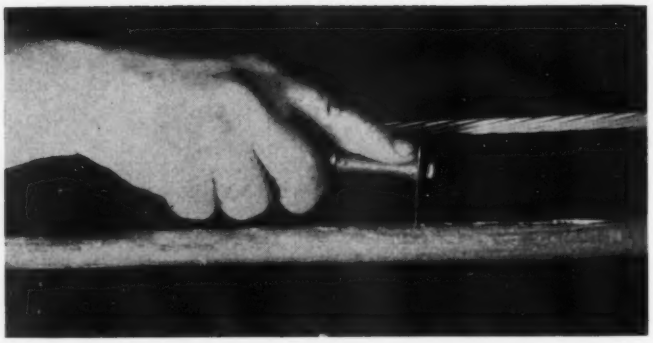
The seam should be worked out carefully from each end of the slit before the lead sheath is spread the full amount.



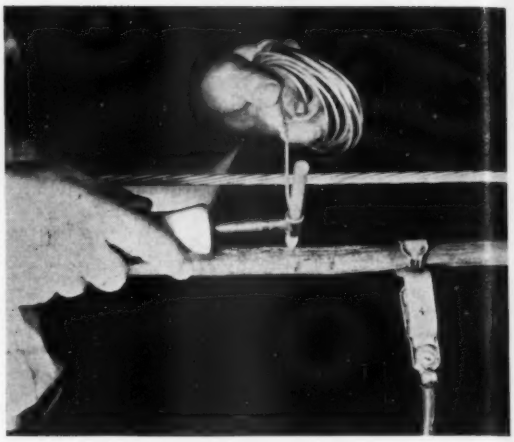
When paper shows in the bottom of the cut the lead cable sheath should be opened as shown above with a special tool that looks somewhat like a pair of pliers.



After the cable has been opened sufficiently, wooden strips should be placed between the sheath and the conductors at each end of the slit so that the outer paper wrapping can be removed.



Before attempting to close the seam, the edges should be well cleaned. This can be accomplished with a shave hook or a file and wire brush.



The arc can be used in a manner similar to a soldering iron to melt solder and close the seam, as shown in view above.

make two heats to complete the drying-out process.

If hot paraffin is poured first on the center of the wet spot on a cable, there is danger that moisture will be driven under the sheath. When the oven will not completely cover a wet spot so as to extend over the sheath a few inches on each end, it should be placed over the wet spot with one end lapping well over the sheath end. After that part is thoroughly dried, move to the same position on the other end for the second heat. The drying-out process should be continued until the pairs all show clear on a voltmeter, or a receiver with battery in series.

The conductors should be belled-out somewhat to facilitate the circulation of heat through them at a wet spot. Sometimes it is necessary to use an iron tie wire or two grade clamps to keep slack in the conductors while they are being dried-out. It is also desirable to open the oven and shuffle the conductors around occasionally to accelerate the drying-out job.

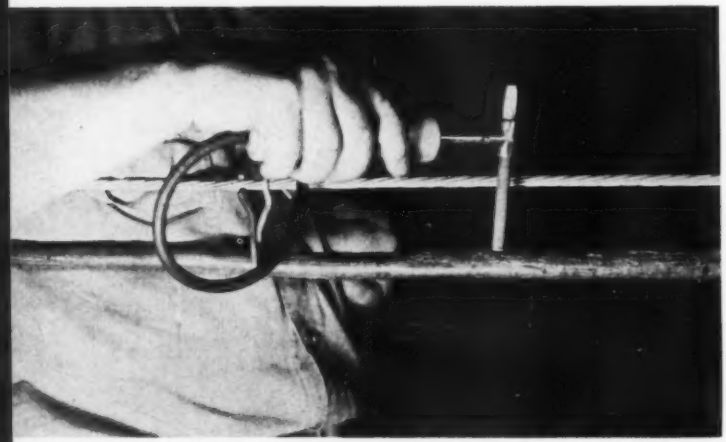
The seam can be leveled down and polished until it is practically impossible to locate the point on the sheath where the opening was made.

Since the oven, cable and messenger all get rather hot, to avoid burns it is a good plan to wear gloves during the drying operation. This method of drying out a wet spot takes approximately the same time as does the paraffin method previously described, but it is an easier operation for one man to use who may have to do this work without a helper.

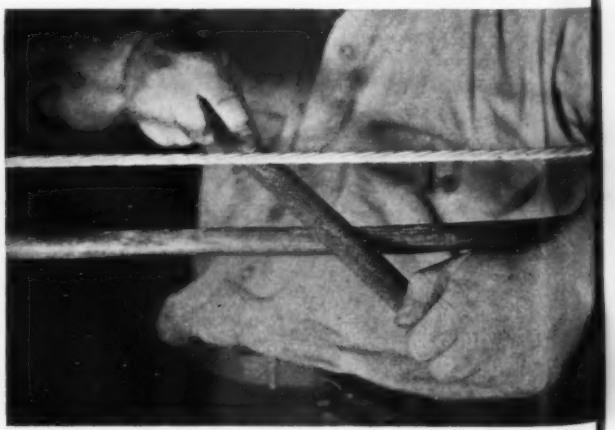
After the cable has been dried-out properly any defective conductors or damaged insulation should be repaired. If it is necessary to make splices in conductors they should be well staggered. To avoid the usual bulk of wool sleeves a special paper tape, somewhat like masking tape and about ½-inch wide can be used to good advantage.

This tape is folded edgewise to form a "V," placed over the conductor and the edges stuck together. The surplus paper can then be cut off close to the cable conductor with a pair of snips.

This paper makes a neat and effective insulation and requires little



The long end of the carbon can be used to good advantage in leveling up the seam.



The bulk of the surplus metal should be removed with a file and then smoothed-up with emery cloth or sand paper.

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more space than the original paper insulation of the conductors.

When all conductors have been repaired they should be wrapped with cotton tape about one-inch wide which has been boiled in paraffin, or with varnished cambric, generally known as empire cloth. This tape should be pulled tight and ends tucked well under the sheath with a blunt instrument which will not damage the insulation of the conductors. It is necessary to tuck the ends of the tape well under to avoid their loosening later.

The lead sheath should now be formed back around the conductors in as near its original shape as possible. At the start of this forming it may be necessary to use a pair of ordinary lineman's pliers and then finish off with the special plier tool. This sheath closing should be done carefully to avoid humps or ridges.

Before the sheath opening is entirely closed, insert a small strip of cardboard for the length of the opening, extending the ends under the sheath so that it will lay directly under the seam and protect the conductors from the excessive heat of the arc-welder. The sheath can be formed down over the cardboard with the special pliers but should not be entirely closed. An opening about $\frac{1}{16}$th inch wide should be left to avoid extra pressure on the conductors and to provide a seam for convenience in starting the weld.

Before attempting to close the seam the edges should be well cleaned. This can be accomplished with a shave hook or a file and wire brush. The cleaned surface should be well covered with stearine. At each end of the cut a small depression should be made in the lead with a half-round file. This can be again built-up level with metal to correct any porous condition which may have been caused by the sharp bending of the lead at this point.

Ordinary resin core wire solder may be used successfully but it has been found that stearine core is somewhat better. The stearine flux burns out better and is less liable to form pockets which could cause leaks. The carbon of the arc should be run along both sides of the sheath opening to tin the surface before starting to close the seam. If con-

An open flame oven is not recommended for use in a manhole, due to the possible presence of inflammable gas. The arc welder might also be a source of danger in a manhole, but if reasonable precautions are taken the arc-welding outfit can be safely used on underground cable work. "We have used our arc welder extensively in manholes, but are always careful to conduct thorough tests in each case to make certain that not even a trace of gas is present."

Splitting a long lead cable sleeve with piano wire is not a difficult job.

The umbrella is a great help to the cable splicer who must work up on a platform in the summer time.

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Model "S" — Output 20 watts 90 volts . . . Price 45.00
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Model "B"—Output 15/20 watts 90 volts . . . Price 52.75
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(Size—15x11x5½. Finish—Black Wrinkle Lacquer)

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Operates on 105-125 volts A. C.

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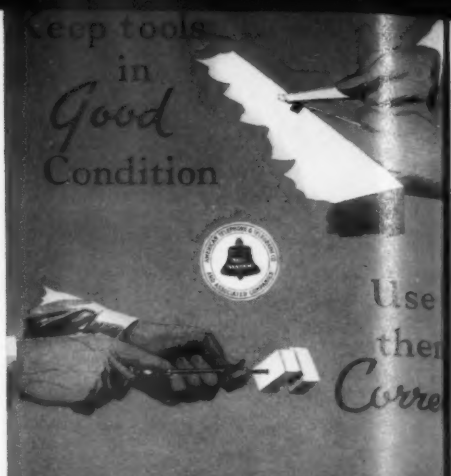
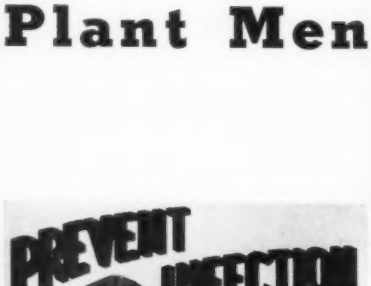
UNITED STATES STEEL

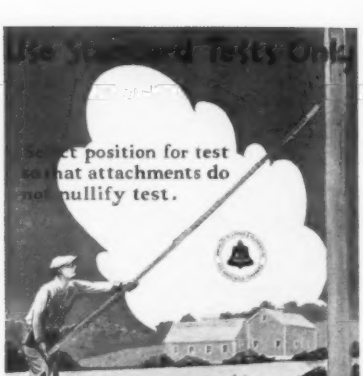
Safety Hints for Plant Men

Use of GAUGE REMOVES GUESSWORK FROM SHARPENING GAFFS
Check
LENGTH
Point must extend to or beyond line
Edge of gauge tight against crotch
THICKNESS
1/8 INCH FROM POINT
USE SMALLER OPENING
Point must not extend beyond line
Slide gauge as near crotch as possible
WIDTH
1/8 INCH FROM POINT
USE SMALLER SLOT
Point must not extend beyond line
Slide gauge as near crotch as possible
THICKNESS
1 INCH FROM POINT
USE LARGER OPENING
Point must not extend beyond far edge of gauge
Slide gauge as near crotch as possible
WIDTH
1 INCH FROM POINT
USE LARGER SLOT
Point must not extend beyond far edge of gauge
Slide gauge as near crotch as possible





TRAFFIC SIGNS AND SIGNALS ARE FOR YOUR PROTECTION.
OBEY THEM.
WAIT UNTIL LIGHT IS GREEN AND YOU ARE SURE CROSS TRAFFIC HAS STOPPED.


Use Standard Tests Only
Select position for test so that attachments do not nullify test.
Know conditions under which poles must be tested

To Prevent Falls
Be sure Steps are secure.
Grip them Firmly
Place Feet Securely on Steps
Clean Soles of Shoes before Climbing

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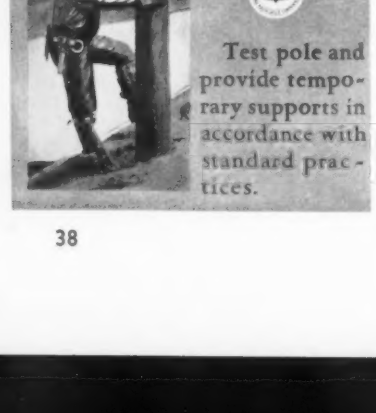
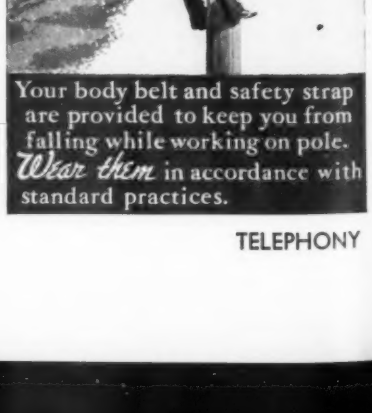

Make sure before you start to climb that pole is strong enough to sustain loads to which your work will subject it.
Test pole and provide temporary supports in accordance with standard practices.


Your body belt and safety strap are provided to keep you from falling while working on pole. Wear them in accordance with standard practices.

sidered desirable, paper stickers can be placed along each side to limit the width of the seam.

The arc can be used in a manner similar to a soldering iron, to melt solder and close the seam. When a short section of the seam has been filled with melted solder, it should be thoroughly heated so that it will flux properly. After a little practice this will come easy.

The heat of the arc can be regulated by adjusting the carbon rod in the holder. The shorter the carbon rod from the clamp to the point, the greater will be the heat at the contact with the cable. The long end of the carbon can be used to good advantage in leveling up the seam. If the arc is properly used very little surplus solder will remain after completion of the weld. The bulk of this should be removed with a file and then smoothed up with emery paper. The seam can be leveled down and polished until it is impossible to locate the point on the sheath where the opening was made.

When moisture is located in a sleeve joint, it is possible to slit the sleeve and effect repairs without disturbing the wipes at either end. The joker in this, however, is that when a splice goes bad one or both ends are generally defective and must be rewiped.

We were advised in the beginning that it was impossible to install a lead sleeve successfully with the arc-welding method. One of our troublemen didn't know this was impossible, so he went out and installed a 30-inch split sleeve on a 50-pair cable. This splice has been in service for more than six months during which time we have had several terrific rains and this cable still shows clear on a 100,000-ohm voltmeter.

The arc weld is the most satisfactory arrangement we have ever seen to close a split sleeve. When the ends of a sleeve are beat-in, it is a simple matter to weld it to the main cable and make a gas-proof joint. If a sleeve will hold gas inside, it most certainly will keep water out.

After many years we have just learned how to split a lead sleeve neatly, easily and quickly. Take a piece of small piano wire, the smaller the better and in no case larger than No. 4 and about 12 inches long. Form a loop in each end and to each loop attach about three feet of heavy cord or strong cotton tape. Thread one of these ends through the lead sleeve to be split and center the short length of piano wire over the edge of the lead sleeve. A steady pull will cause the piano wire to cut the sleeve

(*Please turn to page* 45)

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Pay Stations when located in public places, act as salesmen who are constantly on the job, day and night. An advantage of Gray Telephone Pay Stations is that payment is collected in advance of completion of a call.

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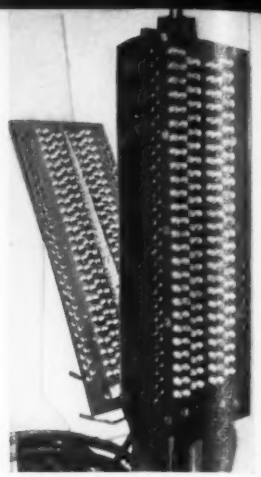
STROMBERG-CARLSON TELEPHONE MFG. CO., Rochester
CANADIAN TELEPHONES & SUPPLIES LIMITED, Toronto, Montreal, Winnipeg and Vancouver
NORTHERN ELECTRIC CO., LTD., Halifax, Montreal, Toronto, Winnipeg, Regina, Calgary, Edmonton, Vancouver
Or any other telephone supply house

From Overhead to "All Underground" Plant

By H. G. ADDIE

Secretary and General Manager of the Northern Iowa Telephone Co., Cresco, Iowa



Close-up of interior of terminal. One panel is mounted on the terminal; the other panel with cable laced and attached to panel is ready to be fastened to the terminal body.

HERE IS STORY OF AN IOWA company which, over a period of years, has changed its distribution to entirely underground from central office into subscribers' premises. Lessons learned from experiences and observations. Method of connecting "underground service" wires with the main cables

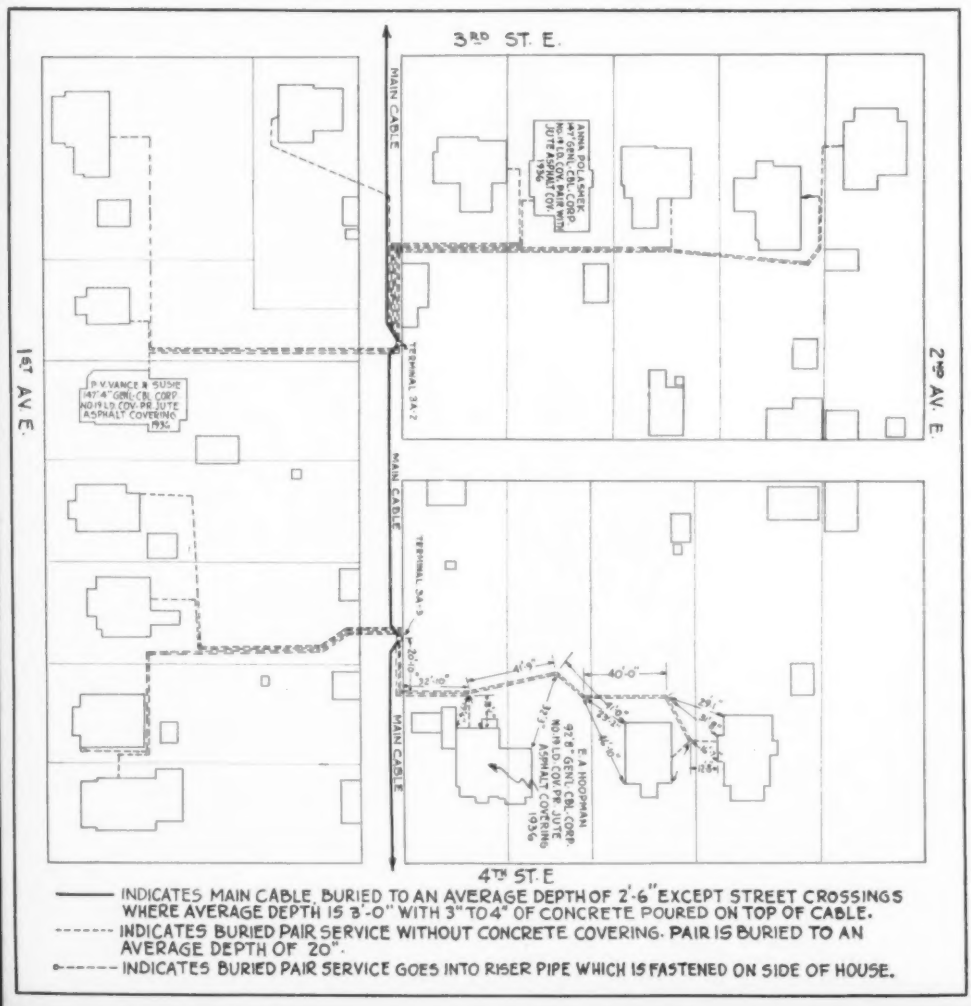
AWAKENED in the night by sleet pounding against the windows—trees cracking, then the ominous crashing of ice-laden poles and wires going down—telephone men of many years' experience never forget the helplessness they felt at such times, nor the nightmare of dismay which came over them when they saw the tangled mass of wreckage the next morning.

To avoid repetition of such experiences many of these men replaced open-wire lines with aerial cable, and felt they then had construction of more permanency. But trees or heavy limbs, occasionally falling onto a cable line, necessitated considerable repair expense, and nearby fires often disabled service by burning up a section of cable, to say nothing of house-movers eternally wanting cables raised to meet the demands of their work.

Thus, many of us realized that, although aerial cable construction was much better and more satisfying than open wire, it still had drawbacks and there must be a better solution of the problem. Then thought turned to underground construction.

Being manager of a company, the writer investigated the experience of other companies. He decided that in the business district of his city, where cables would be relatively large and where there would be a possibility of having to add extra cables to meet increasing demands for service, he would install fibre conduit (laid in a concrete envelope for safety against damage by diggers for plumbing, sewer, etc.) in trenches dug to grades permitting drainage to manholes. The manholes would be poured concrete, trap drained to sewer laterals.

In less congested areas it was decided to install buried cable of sufficient size to provide not only for the present prospective service but also to allow for any future growth. The extra expense of installing conduit construction in residential districts for use with cables of less than


3RD ST. E.
4TH ST. E
1ST AV. E.
2ND AV. E.
MAIN CABLE
TERMINAL 3A-2
TERMINAL 3A-3
ANNA POLASHEK
147'-4" GENL-CBL-CORP.
NO. 19 LD. COV. PAIR WITH
JUTE ASPHALT COV.
1936
P. V. VANCE & SUSIE
147'-4" GENL-CBL CORP.
NO. 19 LD. COV-PR. JUTE
ASPHALT COVERING
1936
E. A. HOOPMAN
92'-8" GENL-CBL-CORP.
NO. 19 LD. COV. PR. JUTE
ASPHALT COVERING
1936
40'-0"
INDICATES MAIN CABLE, BURIED TO AN AVERAGE DEPTH OF 2'-6" EXCEPT STREET CROSSINGS WHERE AVERAGE DEPTH IS 3'-0" WITH 3" TO 4" OF CONCRETE POURED ON TOP OF CABLE.
INDICATES BURIED PAIR SERVICE WITHOUT CONCRETE COVERING. PAIR IS BURIED TO AN AVERAGE DEPTH OF 20".
INDICATES BURIED PAIR SERVICE GOES INTO RISER PIPE WHICH IS FASTENED ON SIDE OF HOUSE.

Block map of buried cable and lead-covered pair construction. Some of the records made on the block maps for each house are indicated, but it was impossible to include all details.

150-pair capacity is not justified, in the writer's opinion, if a proper installation of buried cable is made.

When we first commenced installing buried cable, regular lead-antimony sheath cable was used. As a measure of protection against direct contact with the soil, a layer of asphalt-saturated paper was placed in the bottom of the trench.

The new ground terminal located near an overhead terminal pole is small compared with either man or pole.

The cable was then laid on this paper and covered with another layer of asphalted paper. Over this was poured concrete to a thickness of 3½ to 4 inches, which was left overnight to harden. In the morning workmen filled and tamped the dirt back into the trench. This method proved satisfactory.

Later on, having read of cable sheath being damaged or destroyed in some localities, due to soil action, cinders, ashes, etc., a cable compound was used to cover the sheath. This seemed to be satisfactory and was used for a number of years; but being very messy to put on, arrangements were made with the cable factory to provide cable having a jute-asphalt protective covering over the sheath.

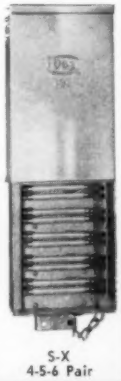
Anyone purchasing cable covered in this way should be sure to get a good job of covering, for unless the covering has perfect adherence to the sheath, there might as well be none. In putting this covering on at the factory, the cable sheath must first be thoroughly cleaned, then flooded with an asphaltic compound. To make the job still better a layer of asphalt-saturated paper is spirally wound over the sheath, followed with two layers of asphalt-saturated jute roving. To prevent stickiness in handling, a coating of talc, is put on, making a job certain to please and one in which you will have confidence.

Some may think placing concrete over buried cables not only excessively cautious but a needless expense. The Northern Iowa Telephone Co. has many cables buried more than 20 years without a case of cable damage by diggers for water, sewer or other purposes. When diggers come to the concrete, they stop, and in that case the extra cost is justified.

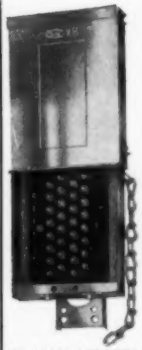
During all these years of installing cable in the ground, terminal poles and cable terminals on the poles were used—the end of the buried cable being brought up the pole and into the terminal, and service distribution being made by way of the usual aerial drop wire construction.

If another cable was to be continued farther into the territory to be served, instead of splicing the two cable ends together and taking out a tap of sufficient capacity to serve the immediate vicinity, and

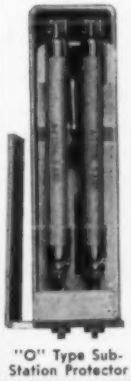
S-6
11-51 Pair



S-X
4-5-6 Pair



XB UNPROTECTED
TERMINAL
11-16-26 Pair



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A GRIP FOR ALL NEEDS

No. 1628-5 B. "Chicago" Grip. Maximum opening .563. Minimum opening .115. Safe Load, 8,000 lbs.

Here's the new "Chicago" Grip capable of handling messenger or guy strand from 3/16 in. diameter up to 1/2 in. diameter. A genuine all purpose grip that can also be used satisfactorily on bare conductors, solid or stranded, from No. 6 to No. 4/0 seven strand copper and A.C.-S.R. up to No. 3/0. A grip that even satisfactorily handles the new three-strand "copperweld" conductor. The bronze-lined jaws prevent slippage. This new grip will afford a sure hold under all conditions, with loads up to 8,000 lbs.

DISTRIBUTED THROUGH JOBBERS

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The four pamphlets listed below will be sent without charge to anyone interested. Check the ones you want:

- ☐ Safety for the Pole Climber.
- ☐ Specifications on Linemen's Belts and Safety Straps.
- ☐ The Safety Factor on Linemen's Leather Goods.
- ☐ Pocket Tool Guide.

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then burying the main splice in the ground, a combined terminal and junction box was placed on the terminal pole. To this pole were brought the ends of the incoming and outgoing cables and they were spliced in the junction box.

The purpose of splicing in the junction box, instead of making the regular splice and tap, for the terminal pole, and then burying the main splice, was that in case of cable trouble developing, the cover would only need to be taken off the junction box in order to find the desired pair, then open it, and make the tests.

This would require much less time than to dig up the buried splice, "blow" the sleeve, open the splice and hunt for the desired pair, test for the trouble and after locating it put the splice in proper condition, replace the sleeve and rewipe its ends. This is a tedious and lengthy job as compared with locating trouble when cable ends are terminated and spliced in the junction box on the terminal pole.

All this proved satisfactory until "trouble" records showed an ever-increasing expense because of drop-wire troubles due to various causes —insulation rubbed off by tree limbs, or sagging onto roofs, etc. However good the material used, it seemed only a short time until drops would be found with insulation off or in poor condition. Although for magneto service drop wire in this condition could be used, it could not be used at all for common battery service, and the increasing, never-ending replacement of drop wiring was getting to be a serious item of expense.

Articles in TELEPHONY from time to time relative to installations where not only the cables were buried but the "services" to the places of use were also underground, created much interest and a desire to look over an installation of this kind for first-hand information relative to advantages and disadvantages of this type of construction. Correspondence with F. C. Woods, general manager of the Intra State Telephone Co., Galesburg, Ill., resulted in an invitation to "come and see for yourself."

Accordingly, the writer went to Galesburg, where Mr. Woods very kindly assisted in getting the information desired. What was seen thoroughly "sold" the writer on the idea of "all underground." Since his visit to Galesburg, many thousands of feet of "buried services" have been installed by the Northern Iowa Telephone Co., and this year's construction plans include an extensive continuance of the "all underground" program.

To bury these "services" and bring them out at a terminal on a pole was not desirable—it looked too much like starting a good job and not knowing how to finish it.

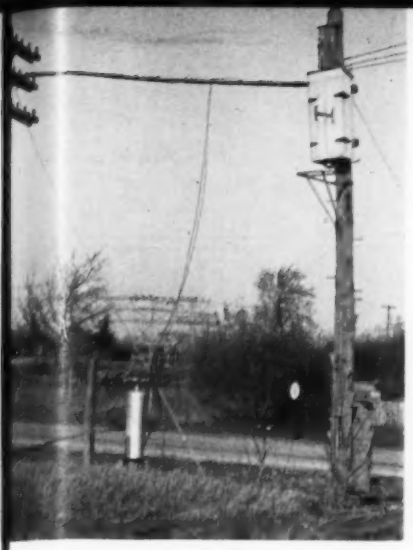
The city in which the changed installation was to be made has alleys in nearly every block. Some of the cables and the terminals to which they would connect would be located in streets somewhere between the sidewalk and curb lines, but the greater number of cables would be located in alleys and connect into terminals placed at the side of alleys. Although there was only a remote chance of vehicles colliding with them, it seemed advisable to design a terminal combining reasonably good looks, strength and utility.

The accompanying illustrations show the terminal and also a comparison with an "overhead terminal pole" and its load of wires. Although the terminal appears a midget in comparison with its "overhead" big brother, it is fully as effective in use, and much more durable.

The terminal consists of a malleable iron standard to which the insulating panels are attached, a malleable iron base which is fastened to a concrete foundation, and a protecting cylindrical cover. The cable enters the container of the base from conduit or covered trenches, and the cable ends are attached to the inner sides of insulated panels. From the connections on the outer side of the panels, individual or group pairs or cables are taken underground to residences or business buildings.

This type of construction leads to worthwhile time-saving and greater

Illustration showing size of mounted and covered terminal as compared with the height of an average-sized man.



A study in contrasts: The small terminal of the underground cable between the two terminal poles which it replaces.

permanency for the terminal units. Malleable iron is used for the base and panel standard to give these parts resistance to shock and corrosion. Should the unit be struck accidentally, the standard and base would withstand considerable distortion before breaking.

In assembly, each main cable terminates in its own compartment and is attached to its individual panel, the panels being on opposite sides of the standard. Cable-end conductors are attached to numbered connecting posts, and the duplicate numbers of the two panels are connected by "jumper" wires. This permits provision for individual or party lines by the attachment or removal of the jumper wires.

Office rack numbers of lines and terminal numbers correspond. Thus in case of cable trouble the repairman may remove the cover of the terminal, locate the corresponding number at the terminal, make tests and discover the trouble, or the direction in which it is, all in a very few minutes as compared with the long time required to remove sleeves, open splices, etc., before trouble tests can be made.

Some have inquired whether "buried cable" and "buried service" installations experience any trouble in these northern climates due to winter frost heaving. The writer's experience has been that, although the thermometer dropped as low as 45 degrees below zero at times and stayed below zero for weeks at a time, no trouble resulted.

When installing "underground services" care should be taken to place them so that there will be little likelihood of their being molested, then block map records should be made so that if it ever becomes necessary the cable may be readily located. At the same time, it is well to make records of installation costs, both as to labor and material, to make a part of plant inventory and also to furnish information for future estimates.

The "services" material to be used will depend upon the soils the cables are to be installed in. If there is no likelihood of soil action damaging the sheath, and care is used to see that there is no contact with cinders, ashes or other damaging material, No. 19 pair rubber-insulated copper conductors with jute fillers—all wrapped with tape and the whole covered with a 1-16 inch thick bare lead sheath—will be very good. But if there is a suspicion that soil and other contacts will be damaging to the lead sheath of the pair, then there should be protective covering on the sheath, the same as on the main cables.

This may seem expensive construction, more than our former aerial construction; but if elimination of unsightly poles with overhead wires and cables, improvement in looks of plant, freedom from trouble, and peace of mind experienced—knowing that buried lines will not be disturbed by raging storms—are worth anything, then the extra cost of construction, if any, is a very minor item compared with benefits received.

To this date, not one disturbed pair or a single case of trouble has occurred to or with any of the many hundreds of "services" which we have installed.

▼ ▼

WIRE—AN ESSENTIAL FACTOR

(*Continued from page* 19)

aged during installation so that its line life is considerably shortened. Special care should always be exercised to avoid even the slightest injury or kink to new wire. Heavy tools or material should never be piled on drop wire coils in a truck. The protective wrapping of either burlap or paper should never be removed from the coils of new wire before actually ready to start stringing them.

When paying out twisted pair wire, spirals and kinks may be avoided by reversing the coil each five or six turns. Good reels, which conveniently take a standard coil of drop wire, are now available at a reasonable cost. Reels, which will answer the purpose fairly well, can also be built locally. Reels always prove a worthwhile investment as they save many a case of drop wire trouble.

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TYPE 11 SUBSTATION PROTECTOR

A compact, all-porcelain protector of the latest "rosette" type which, when closed, has no projections or exposed terminals. Equipped regularly with 5-ampere glass fuses and Type 2105 discharge blocks, giving full protection against lightning and crosses with electric circuits.

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They can be permanently mounted on the installation truck when desired.

When stringing parallel drop wire from pole to building, or along a pole line, it is desirable that several twists be left in each span as transpositions. When parallel wire is taken off a coil by hand, the twists will be made automatically; but when pulled from a reel it is generally necessary to twist the wire occasionally at the pulling end.

The standard braid stripper is a most useful tool on parallel wire. This tool will neatly remove the outer braid without causing injury to the conductor insulation. Some telephone men are of the opinion that the splicing of parallel drop wire is difficult, but this is not the case when the job is approached in a proper manner. After the outer braid has been removed the conductor should be bared so that the splices will be staggered.

For splicing the conductors, use either the copper half-sleeve, which is twisted, or the new single compression type sleeve. A wrapped and soldered splice should not be made in drop wire when it can possibly be avoided. Cover the joints with two layers of rubber tape, pressed down well in place. Then wrap the entire splice—that is, all the section of the wire from which the outer braid has been removed—with two layers of friction tape.

The use of new drop wire should be planned so as to avoid all splices possible. Splices, even when most carefully made, do represent a weak point in the line and a possible source of trouble.

When twisted-pair drop wire is tied-in on knobs it is always best to use the double-groove variety of knob with one conductor placed in each groove. Parallel wire may also be tied-in on one groove of a knob. Ties for parallel wire can be made from one conductor of twisted pair, or from a piece of parallel wire itself. It is tied-in in a manner quite similar to that used for twisted pair wire.

At the present time drop wire clamps are used in this country almost exclusively for the support of parallel wire. They are economical to use, and do a good job with uniform results. Some men can make a good wire tie on drop wire but the majority cannot. A drop wire generally develops defects first in the tie on the knob.

Dead-end clamps are usually of two types; one grips the wire with a sleeve and wedge arrangement, and the other is a spiral arrangment which grips the wire with a capstan effect. Both types may be recovered for re-use. Both types may also be successfully used with twisted pair as well as with parallel wire.

The drop wire "clip" is used to replace intermediate ties and is clamped on the wire with an ordinary pair of lineman's pliers. Drive hooks are generally used to support these clamps although the loop of wire attached to the clamps may be slipped over a glass insulator or a porcelain knob of any type, if it is desired to re-use old pole or building attachments.

While there is no doubt that present-day drop wire is the best in history, this does not mean that it should be expected to give perfect service under unreasonable conditions. It should be carefully protected from abrasion at all times. Drop-wire runs on buildings are generally supported on "C" knobs, bridle rings or insulated rings. The "C" knob is also generally used for the dead end at the building entrance.

On some building runs it is often impossible to clear all obstructions, such as soil pipes, gutters and masonry projections. The drop wire should be given additional protection at such points, either by several layers of friction tape, porcelain tubes or flexible loom taped in place.

Trees should always be avoided when possible, even at the expense of running several extra spans of wire. When it is impossible to avoid small limbs and foliage on a tree, the drop wire may be protected by sliding a length of flexible loom over it and taping the ends down well to hold it in place.

When it is impossible to obtain tree clearance any other way, it is permissible to break the drop from the center of a messenger span instead of at a pole. A special span clamp should be used for this purpose. Span clamps are generally considered objectionable, because they increase the difficulty of riding the span in a cable car and make the clearing of trouble on the drop difficult. There are times, however, when their use is justified.

Drop-wire tree attachments should also be avoided when possible. When tree attachments are used, care should be taken not to attach to a tree or limb smaller than three inches in diameter.

Ordinarily several parallel drop wires should not be placed in a bridle ring run for any great distance. They may crosstalk, and No. 18 bridle wire would probably be cheaper anyway.

(To be concluded next week)

THE ERECTION OF TELEPHONE POLES

(*Concluded from page* 23)

may be dug for it. If the ground is soft and there is danger of the gin pole caving into the hole, it may be set on a length of heavy plank.

The gin pole should be guyed firmly in place and raked slightly toward the hole for the line pole. Either good rope or messenger strand may be used for the guys. When trees or poles are not available for attaching guys, some type of easily-recovered patent anchors or a deadman may be utilized.

The blocks, usually three sheave, should be attached to the gin pole near the guys at the top and the other end to the pole being raised, just above the balancing point, so that the butt section will be slightly heavier than the top. The fall line from the blocks should be run through a snatch block attached to the gin pole about a foot above the ground. This relieves much of the strain on the guys and keeps the gin pole firmly in place on the hardest pull.

While the pole is being elevated, two men should ride the butt and guide the top so as to clear the gin pole and guys. A long pike pole may sometimes be of assistance. When the pole has been sufficiently elevated to assume a vertical position, it may be easily lowered into the hole dug for it.

On extra long poles it is always a good plan to attach three small guy ropes near the top to assist in aligning the pole for tamping after it is in place. Good sash cord is satisfactory to use for this purpose. This method is generally much easier than pike poles.

The Bull Rope Method

When due to some local condition none of the methods previously described is suitable, the bull rope method—a special adaptation of the gin pole—may sometimes be used to advantage. Often a nearby existing pole may be used to support the snatch block for the bull rope.

To simplify guying when using this method, we sometimes lash two poles together at the top, spread the butts about 12 feet apart, and use the poles to support the bull rope. When erecting an especially large and heavy pole we sometimes make use of two of these fixtures so as to reduce the strain on the main bull rope.

The first fixture merely replaces the jenny, as used when piking-in poles by the hand method, and gives the bull rope a more lifting effect right from the start. This action is considered necessary to properly anchor the butt of the pole in the hole and to prevent it kicking out before gaining sufficient elevation.

The hole should also be well trenched and a heavy plank placed for the butt of the pole to slide down on. At least three good guy ropes should be attached near the top of the pole and a man detailed to handle each one at the anchor. These guy ropes should be pulled up or slacked off as the pole elevates to keep it in proper line with the pull on the bull rope. These ropes may later be used to line the pole for tamping.

If a good winch is available it can probably be used for power when erecting a pole in this manner. If a direct pull from a truck is being used for power, then a good set of three-sheave blocks is recommended. The blocks provide much better control and greater safety.

The erection of poles by any of the methods described is considered absolutely safe if proper precautions are observed. In the first place, always exercise extreme care with all rigging, and then check back to make sure that it is just right. Above everything, don't hurry; rushing never spells gain in any work, and this is especially true in pole setting.

Make sure that all knots are safe, even if you have to call upon a Boy Scout for assistance. Use only good rope and place a safety tie on all block hooks so that they can't possibly slip. Use good slings and test the load on them before starting the main pull. You will find it far better to spend a little extra time on the job checking and testing than to be forever sorry.

▼ ▼

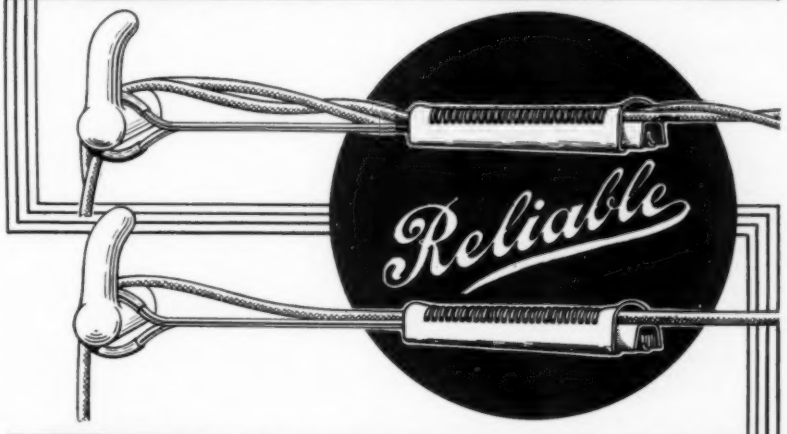
CABLE SHEATH REPAIRS EASILY MADE

(*Continued from page* 39)

better than any method we have ever seen used. The cutting wire can be guided by the pull so as to follow a straight mark or line.

Use of the open flame oven in a manhole is not recommended due to possible presence of gas. The arc might also be a source of danger from this cause although we have used ours extensively in manholes. However, before attempting to make use of the arc welder in any manhole, we are always careful to conduct thorough tests in each case to make sure that not even a trace of gas is present. If reasonable precautions are taken, we are of the opinion that

"STANDARDIZE DEAD-END TIES"



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- The type "P" drop wire clamp is
- an ideal device for attaching
- No. 17 B&S twisted pair or
- parallel drop wire to poles and
- buildings. It prolongs the life of
- the drop wire, permits free
- swinging at the tie, places all
- of the wear on the hardware
- and eliminates the sharp bends
- necessary with other methods.

This clamp is easily and quickly installed, making a very neat installation. Slack in drop wires can be taken up quickly without leaving any weak spots on the wire. Write for samples.

Reliable ELECTRIC COMPANY
OVER 25 YEARS SERVICE TO THE UTILITIES

BLACKBURN J. B. CABLE KITS

FOR REPAIRING LEAD SHEATH CABLE BY THE NEW ARC-WELDING PROCESS

This new process has been thoroughly tried and proven in over 4,000 cases of widely varied cable trouble during the past three years, and is now extensively used by many telephone companies in this Country and Canada. The savings are tremendous. Cable can now be permanently repaired or spliced by one man. No particular skill or experience is required. The process involves the use of specially designed tools for slitting the cable open and welding it together again, using an ordinary storage battery. A unique portable oven is used to dry out any moisture which may be present. The process may be applied to any type of cable repair. All that is needed to perform this process besides the regular equipment of a lineman and an ordinary storage battery, is a J. B. Cable Repair Kit.

For further information, fill in and return this coupon. No letter is necessary.

Your Name .....

Company .....

City ..... **State** .....

JASPER BLACKBURN PRODUCTS CORP.

First and Clinton Sts. St. Louis, Mo.

the arc can be safely used for underground cable work.

Some readers of this article who have used the arc welding outfit for cable repairs may not agree with all the things described although they have all been tried and proved. We have been so successful with this work that we are convinced that there is nothing further to be desired. But we learn some new tricks on almost every job and there is ever a possibility that somewhere, someone, has improved on our efforts. If this be true, we hope they will not keep it a secret.

In our opinion no one should have the slightest fear that he will have any difficulty in learning to use this new method. It is so much easier to learn than the lead-wiping method that there is no comparison. Students can experiment with old cable in the storeroom until they are sure of themselves before taking a case of actual trouble.

A short length of cable can have both ends closed, a slit made in the side and then closed by the arc-welding method. To test the weld an ordinary bicycle tire valve can be soldered on and air pressure applied with a hand pump. The cable may then be submerged in water to determine whether or not it will blow bubbles. The training necessary for the installation of a split sleeve may also be gained in like manner. If a gas testing outfit is available, this test may be simplified as the gas valve can be simply clamped in place. It will be surprising how often the very first attempt will prove air or gas tight.

Necessary tools and material to make cable repairs in the manner described can be purchased in convenient kit form at small cost. Even though its use may be confined to only an occasional repair of small holes, cracks and ring cuts, it will most certainly in our opinion prove a good investment in any telephone exchange. One thing must be observed in this connection. It is to hollow out a small depression around the hole or ring cut and then fill it with metal so that it can be dressed down even with the rest of the sheath. If metal is built up thicker than the sheath at one of these repair points, it tends to absorb vibration which fatigues the metal and may cause a crack.

There is one thing we feel it our duty to add even at the risk of being called Offety Goofety by the cable-splicing fraternity. If one of these kits is obtained and placed in the hands of an old cable-splicer, he will probably say after a trial that it is no good. Splices or repairs made by him with the arc welder may even go bad, and he will claim that he can work faster and better with wiping cloths and metal.

This will probably be true, although I am at a loss to explain it, for many who can not make repairs by wiping joints can successfully do so with the arc welder. We have never known of a single case where a good honest trouble-shooter or lineman with the necessary preliminary training could not make cable repairs with the arc welder which were just as lasting as wiped joints.

▼ ▼

U. S. Association's Suggestions on Airport Bill

The United States Independent Telephone Association has filed a brief with Clarence F. Lea, chairman, House committee on interstate and foreign commerce, on HR 9738 (a bill to create a Civil Aeronautics Authority) with especial reference to section 1108. This section deals with the placing and maintaining of lights and other signals on structures on the civil airways "or elsewhere."

It is suggested that the word "elsewhere" be eliminated because it unduly expands the scope of the bill beyond the civil airways.

"We do not believe," the brief continues, "that the cash burden of placing lights or other markers should be imposed on the telephone companies, but that this burden should be borne by the person or persons benefited by the erection of the lights or markers. This is the situation existing in the vicinity of airports."

A revision of the section of the act embodying the suggestions of the association is given in the brief which was drawn up by the association's general attorney, Alfred L. Geiger and submitted to Chairman Lee by President J. H. Agee.

Mr. Agee states that the association is in favor of the bill and that it favors and supports every proper program which tends to greater public safety in the construction, operation and maintenance of airports.

The association, however, "must oppose any legislation which would attempt to compel any telephone company to maintain lights on its pole lines which are needed to service the airport with communication service, where such proposal requires the telephone companies to install and maintain lights at its own expense. It could easily follow that the cost of furnishing lights would far exceed the telephone revenue."

The association believes that "requirements for lighting the telephone poles should contain specific requirements as to distance from the field, so that in cases where telephone lines are close to airports, even though the airport is not being provided with telephone service, the telephone companies could either relocate their poles or light them, as they chose."

▼ ▼

ACCIDENTS ON THE WAY TO HAPPEN

(*Concluded from page* 27)

he slipped on a rung, it took some little time to get his bruised body separated from the ladder, to say nothing of the time it took to heal the cut on his leg where the gaff left its mark.

In connection with the hooks-and-belt story, we have quite a collection of safety belts. One belt, which is fully two inches wide and carries standard tested snaps, may be compared with others of varying widths and thicknesses which are equipped with unsafe hardware. A buckle which has more than a single tongue has a tendency to weaken the belt, because it requires more holes and won't hold a bit better.

The body belt should be so made that the strap which passes through the buckle to hold it on, goes *through* the "D" rings instead of *behind* them. That gives quite a little added protection, should the ring fastener give way. The man who has snapped both ends of his safety to one D-ring to allow more reach, is putting too much confidence on a few rivets and some thread.

Incidentally, your safety belt can be made to last longer if it's kept soft and pliable by dipping in harness oil when it shows the slightest stiffness. This will cost but ten cents once or twice a year.

There is just one way to sharpen hook gaffs and that is by filing them on the inside. Any other method makes them needle-pointed and changes their angle in such a way that their tendency is to pull out of the pole rather than to sink in deeper. But when they get too short, the proper one to repair them is the manufacturer, and it won't cost any more for a good job. The manufacturer understands the importance of making them safe.

One seldom sees a ladder without metal claws on its feet, but we mustn't forget that those small teeth or claws will wear off. When that happens a ladder is apt to give one a ride on slippery pavement, after a man has climbed about half way up. Most of these claws are arranged in a wheel form and may be turned four times to present a fresh surface; after that, they're due for the storeroom exchange.

A freshly-painted ladder always looks nice; but the decorative color may hide weather checks or cracks that wouldn't escape notice if the ladder were treated with transparent water spar varnish when new.

And before leaving the subject of ladders, remember in putting a ladder up in the air—for every four feet *up*, move it one foot out!

Did you ever untwist a badly-frayed rope to see why it broke so easily? If you notice how the strands are made up, you may readily see why they won't stand much rubbing. Every severe abrasion cuts the small threads until one entire strand is nothing but a hollow, U-shaped section which has absolutely no holding power. Dragging a new rope behind the car may straighten out the kinks, but when you get it untied you have only a skeleton left.

Occasionally, someone tries to use a screwdriver for a chisel which, of course, is all wrong. But in selecting a chisel, be sure to avoid using one like those pictured. Ends of steel, flying off the mushroomed chisel heads, inflict a painful and dangerous wound. A blacksmith can make worn heads like new in a hurry.

Our latest picture shows the carelessly dangling handline — wonder what's going to happen "upstairs" when the line jerks? It's an easy matter to tie it up safely—out of the way. Then, too, "Men Working" signs will add a lot of protection to the ladder and to the ground crew. Flags in sockets at the side of the signs add to their effectiveness, and catch attention quickly.

That's the way accidents look "going some place to happen." Since we've steered clear of a few of them, we thought we would pass our experience along—in the hopes that many other telephone men will be on guard to sidetrack similar accidents "going some place to happen."

▼ ▼

Railroad Communication Men Cancel Convention

The annual convention of the telegraph and telephone section of the Association of American Railroads, scheduled for St. Louis, Mo., October 18, 19 and 20, has been cancelled according to Secretary W. A. Fairbanks.

The abandonment of this annual meeting of railroad communication men is due to the prevailing low level of business and the necessity for the railroads and the association to curtail expenses to the greatest possible extent.

YOU SHOULD KNOW ABOUT This BATTERY

THE TWIN-SIX

It's lighter—it's smaller—it's easier to use than old type No. 6 cells! And yet it PACKS MORE POWER—MORE EXTRA HOURS OF SERVICE.

It pays you to know these facts about the Burgess Twin-Six 4F2J Telephone Battery. Specify it as standard in your maintenance work. Realize extra profits from its longer life, better, more dependable service—clearer transmission.

Order your Twin-Sixes today. Cost—49c in lots of 30 (57c in Pacific territory). Freight paid to your telephone exchanges.

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From the world's largest and most complete trailer and body plant, eighteen years of continuous and successful trailer manufacturing is clearly reflected in every model.

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There are types for every need to solve your problems of transporting long loads of poles, pipe, girders, trusses, transformers, reels of cable and other materials used by utility organizations.

HIGHWAY TRAILER CO.
EDGERTON WISCONSIN

Oklahoma Bell Rates and Charges Readjusted

A READJUSTMENT of rates of the Southwestern Bell Telephone Co. applying to local exchange rates at Oklahoma City and Tulsa, abolition of handset differential charges applying to exchanges of that company throughout the state after the subscriber has had a handset 18 months or more, and general readjustment of certain toll rates and service charges, were directed by the Oklahoma Corporation Commission in an order issued April 4.

The order, while increasing certain toll rates and permitting service charges now barred, will reduce exchange rates at Tulsa and Oklahoma City and is expected to reduce revenues of the Southwestern Bell Telephone Co., in Oklahoma, approximately $350,000 a year, according to an estimate by Paul Reed, auditor of the commission.

The rate readjustment order followed action of the Oklahoma Supreme Court in granting a joint application of the Oklahoma Corporation Commission and the Southwestern Bell Telephone Co. for remanding to the commission several appeals pending in the court involving Bell rate cases. The commission then conducted a hearing March 30 in the remanded matters in which evidence was presented by the company affecting the statewide rate situation.

The commission, in its order, of April 4, ruled on several controversial matters which have been at issue for many months. Following hearings, March 1 and March 11, on the handset issue, the commission ordered that the handset differential charge of 15 cents per month should be eliminated whenever a subscriber has had a handset for 18 months or more. All subscribers ordering handsets installed shall pay the 15-cent charge for a period of 18 months, after which it shall be discontinued.

The commission held that, while there was doubtless need for the differential when handsets were first introduced, the difference between the cost of the desk set and the handset has been reduced to so slight a margin that the differential is no longer justifiable, except to apply to new users of handsets for 18 months to prevent a deluge of applications for changes from the old to the newer equipment. The desk-set phase of the order applies to all exchanges of the Southwestern Bell Telephone Co. throughout the state, including Oklahoma City and Tulsa.

In deciding the Tulsa rate case which the company had unsuccessfully attempted to appeal to the United States Supreme Court, the commission ordered a new schedule of residential rates which will permit revenues in Tulsa of $7,327.79 per annum in excess of reductions ordered in commission order No. 8666 from which the company appealed.

The new Tulsa monthly rates are: One-party, residence per month, $2.85; two-party, residence per month, $2.35; and four-party, residence per month, $1.85.

The handset differential elimination on an 18-months' basis also was taken into consideration by the commission in ordering slightly higher rates applying to Oklahoma City than were provided in the original rate reduction order for that city which the company appealed to the Oklahoma Supreme Court.

COMING CONVENTIONS

Kansas Telephone Association, Hotel Kansan, Topeka, April 27 and 28.

Ohio Independent Telephone Association, Deshler-Wallick Hotel, Columbus, May 3, 4 and 5.

Indiana Telephone Association, Claypool Hotel, Indianapolis, May 11 and 12.

Wisconsin State Telephone Association and Wisconsin Locally Owned Telephone Group, Park Hotel, Madison, May 17, 18 and 19.

North Dakota Telephone Association, Gardner Hotel, Fargo, May 17 and 18.

United States Independent Telephone Association: Conference of Class A and Class B Companies, Edgewater Beach Hotel, Chicago, May 25 and 26.

Pennsylvania State Telephone & Traffic Association, Yorktowne Hotel, York, June 2, 3 and 4.

New York State Telephone Association, Seneca Hotel, Rochester, June 7, 8 and 9.

Washington Independent Telephone Association, North Bend, June 24 and 25.

Michigan Independent Telephone Association, Hotel Olds, Lansing, July 27 and 28.

The Illinois Telephone Association, Hotel Pere Marquette, Peoria, September 21, 22 and 23.

CUSTOM

By MISS ANNE BARNES

Traveling Chief Operator, Iowa Independent Telephone Association, Des Moines, Iowa

SOMEONE has said: "There is no tyrant like custom, and no freedom where its edicts are not resisted."

Custom becomes second nature after one has followed a beaten path for a considerable time. Until we grow used to its edicts, we fume, fret and resist acceptance. After awhile it sometimes tricks us into indifferent acceptance without selling us the reason for its need. If a custom is a good one, then its benefits are wasted. If it does not fulfill the purpose intended, it is sooner or later discarded and we have had our fuming, fretting and resisting all for nothing. No, not all for nothing—but for no good purpose because we are stamped as folks who do not take instructions kindly.

How often this has been proved true in our acceptance or resistance of new telephone operating practices.

We will fare better in the long run if we conform to the customs of the majority for, by so doing, we will not draw attention to ourselves. "Excess either way shocks."

Moral: Use is the test of the value of things.

New Oklahoma City rates will be $10.87 for PBX trunk lines against old rates of $11.25; one-party business, $7.25, against $7.50; one-party residence, $3.10, against $3.25; two-party residence, $2.35, against $2.50, and four-party residence, $2.10, against $2.25

Total refunds of approximately $340,000 to telephone subscribers of Oklahoma City and Tulsa exchanges are ordered made by the Southwestern Bell company, representing difference between the new charges authorized and old rates.

It was brought out at the recent hearing that every state except Oklahoma permits collection of a report charge designed to cover partially the cost to the company of uncompleted toll calls. The report charge was allowed on uncompleted interstate calls only.

The evidence disclosed that certain patrons had worked out elaborate code systems whereby they communicated information without any recompense whatever to the telephone company. The commission, therefore, authorized the schedule of report charges applicable to Southwestern Bell toll lines throughout the state. These charges vary from 10 cents for rate distances where the day station-to-station rate is from $0.10 to $0.45, to 35 cents where the day station-to-station rate is from $1.75 to $2.05.

The Southwestern Bell Telephone Co. has been permitted to collect a move charge from subscribers moving from one location to another, but not a service connection charge from new subscribers. The commission found that service connection charges are standard in nearly every state and, therefore, authorized two schedules of connection charges to be applied by the Southwestern Bell company in Oklahoma. One schedule applies to exchanges having less than 5,000 stations in service and the other schedule to exchanges of more than 5,000 telephones.

Witnesses testified, at the recent hearing, that there was a disparity between interstate and intrastate toll rates on messages up to 90 miles, accounted for by the fact that interstate rates are under the jurisdiction of the Federal Communications Commission. The new commission order wipes out this discrimination and permits the company to file revised intrastate toll schedules for up to 90 miles on the basis of interstate rates. Auditor Reed of the commission estimated that this adjustment will net the company $150,000 a year additional.

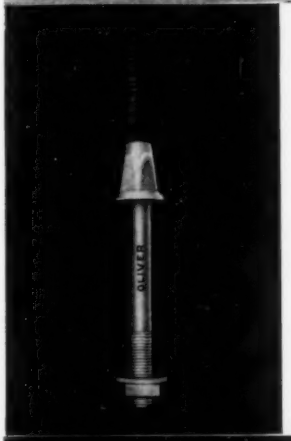
The commission holds that because of the extent of the task, it cannot at this time, readjust rates for the Southwestern Bell Telephone Co. on all its exchanges in Oklahoma. It, however, vacates its former order denying the company an investigation of its rates on a statewide basis and orders the commission staff to begin and conclude, as soon as possible, a statewide investigation of plants, properties and business of the Southwestern Bell Telephone Co., in Oklahoma.

M. J. Stooker, general manager of the Southwestern Bell Telephone Co., in Oklahoma, said that the commission order, while granting some readjustments that were necessary, does not solve the problem of, "our inadequate overall return in the state."

OLIVER

POLE LINE MATERIAL

A good specification - always!



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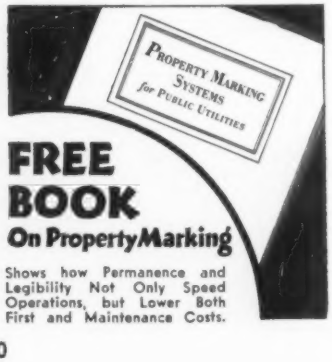
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Condensed Telephone News

Franchises

LONG BEACH, CALIF.—The Associated Telephone Co. was granted a 28-year franchise March 8 when the city council voted unanimously to adopt the ordinance making the franchise effective 30 days from the date of adoption. The company had asked for a 35-year franchise. The one granted includes provisions that the city will receive 2 per cent of the company's gross receipts, free telephone service and other concessions equal to about 1 per cent, and access to the city lines, conduits and other facilities of the company.

KIMBALLTON, IOWA—Voters recently approved an ordinance renewing the franchise of the Marne & Elk Horn Telephone Co. for a period of 20 years.

DAVENPORT, WASH.—The Harrington Northwest Telephone Co. was recently granted a 50-year franchise by the county commissioners for lines along five miles of county road.

Financial

NEW YORK, N. Y.—The board of directors of General Telephone Allied Corp. has declared the regular quarterly dividend of $1.50 per share on the $6 preferred stock of the corporation, payable May 2, to holders of record at the close of business April 15.

Construction

THOMASTON, GA.—The Thomaston Telephone Co. has started an expansion and rebuilding program which will cost $25,000 according to W. M. New, president. The work is expected to be completed this spring.

Larger cables have already been laid to many sections of the city and to several of the mills. The program includes the replacement of a portion of the equipment.

PERRY, GA.—The Southeastern Telephone Co. of Georgia has been making improvements in its equipment in Perry recently. Underground cables have been laid to replace overhead lines on several streets. This work has been done by the district construction crew and C. L. Anderson, maintenance man of the local office.

Mrs. Donna Kate Harrell is the new operating agent of the local office. Her assistants are Mrs. J. B. Hawkins and Mrs. Curtis Clark.

The Southern Bell Telephone & Telegraph Co. is rebuilding its toll lines from Perry to Macon and from Perry to Fort Valley.

CAPE GIRARDEAU, MO.—Plans of the Southeast Missouri Telephone Co. include the erection of a new exchange building here, of buff brick and reinforced concrete.

SIKESTON, MO. — Workmen have started construction on Sikeston's new $40,000 branch office of the Southeast Missouri Telephone Co. The new structure is located next door to the Sikeston city hall and occupies a space 61 ft. by 35 ft. on a lot 40 ft. by 120 ft. New equipment will be installed.

The building will be a two-story fireproof structure built of reinforced concrete. It will have wire glass windows with steel frames and a full basement.

CLYDE, OHIO—Plans are being drawn for a new local exchange building by the Northern Ohio Telephone Co. William C. Henry, general manager of the company, has asked the Clyde city council for permission to place all cables underground in the business district, which is part of the plan for improvements in that community.

DELAWARE, OHIO—Under a $30,000 project the old magneto telephone exchange at Kilbourne, five miles east of Delaware, will be replaced with an automatic dial system for the 130 subscribers.

Work of installing the new system will be started about June 1, according to Fred G. Williamson, local manager for the Northern Ohio Telephone Co. Installation is expected to take eight months' time.

Telephones

NEW YORK, N. Y.—General Telephone Corp. reports for its subsidiaries a gain of 1,017 company-owned telephones for the month of March, 1938, as compared with a gain of 2,326 telephones for the month of March, 1937. The gain for the first three months of 1938 totals 2,744 telephones (exclusive of purchases) or 75 per cent, as compared with a gain of 6,470 telephones, or 1.93 per cent for the corresponding period of 1937.

The subsidiaries now have in operation a total of 366,157 company-owned telephones.

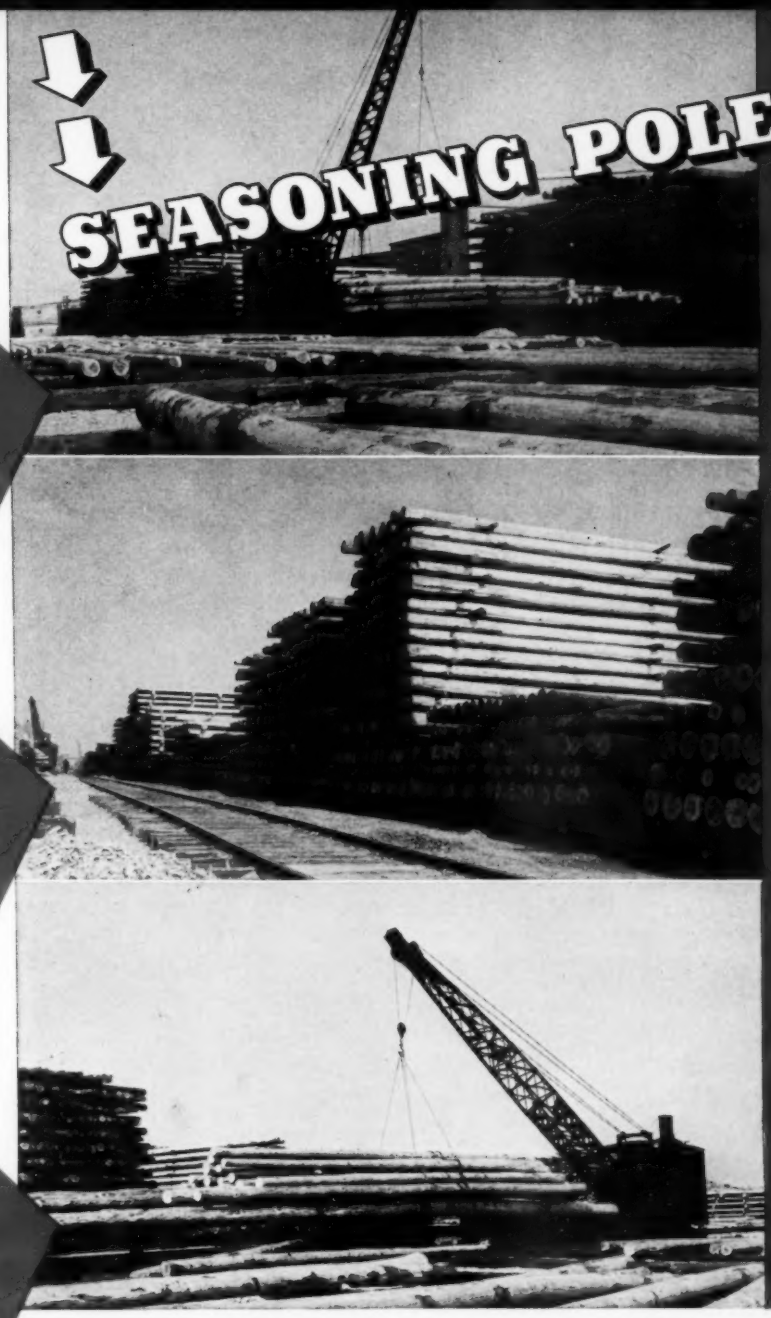
COLUMBUS, OHIO — That the use of telephones is increasing monthly in Columbus is shown by the fact that the Ohio Bell Telephone Co. now has 79,065 telephones in use in the local exchange area. The company reports that during March it made a net gain of 288, with 1,445 telephones having been installed during the month compared with 1,157 disconnections.

With the company having scored a net increase for many months, it is rapidly moving back toward the all-time high peak reached in May of 1930 when there were 81,582 telephones in service in the exchange area. The low point was reached in July of 1935 when there were 63,428 telephones in service.

Obituary

TERRE HAUTE, IND.—Word has been received here of the death at Croton-on-Hudson of Caslin Higgins, 72 years old, organizer and first president of the Citizens Independent Telephone Co. of Terre Haute. Mr. Higgins came to Terre Haute in 1888 as a young attorney and was United States commissioner for western Indiana from 1898 to 1908. He was one of the organizers of the Young Republican movement and at one time was member of the Terre Haute board of safety. He was a member of several patriotic, legal and social organizations and was a close friend of many notable political and literary figures. The widow survives.

SEASONING POLES FOR LONG SERVICE LIFE


Unloading Poles for Air-Seasoning
Carefully Stacked Poles Undergoing Air-Seasoning
Loading Air-Seasoned Poles on Trams for Pressure-Treatment

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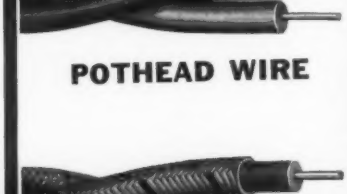

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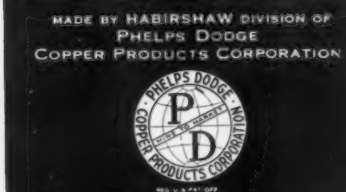

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Plant Men Talk Things Over

Accident Prevention In Climbing Poles

"The best safety device is—a careful employe." This is the crux of the safety advice given by J. P. Borden, division safety supervisor of the Central Electric & Telephone Co., southeast division, and the Virginia Telephone & Telegraph Co., of Charlottesville, Va., in a recent issue of the South East Division News. "It is easier to share the responsibility for accident prevention," he states, "than to shoulder the responsibility for the accident."

Three precautions are urged by Mr. Borden to prevent possible accidents in climbing poles that are stepped. They are as follows:

Climbing Telephone Poles That Are Stepped

Soles of the shoes should be cleaned before an employe starts to climb poles. All mud, ice, snow or other substances which might cause feet to slip on pole steps or crossarms should be removed.

Condition of pole steps should be determined before an employe puts his weight on them. If steps are bad, report this fact to your supervisor so that proper repairs will be made.

Grip the steps firmly and securely with your hands and be sure that your feet are on the steps correctly.

These general safety measures are also presented:

General Precautions For Pole Climbing

Never climb a pole until proper examination and testing have been made to assure yourself of safe climbing.

A pole in a straight line should be tested with a pike before climbing.

A pole on an angle and guyed should be tested at the bottom.

When wires are to be removed, the pole should be anchored well enough to make it secure after the wires are removed.

Poles braced with pikes alone are liable to fall when wires are removed. Remember also that pikes will cut out if the pole turns. Use ropes for temporary guying.

When a new pole is set alongside the old one—lash the old pole to the new one securely before removing wires from the old pole, tie them together at the top and bottom. Do this as soon as the new pole is set.

Spurs do not cut out when properly placed. Look for knots and cracks.

Never use your safety belt as a lash—that is, placing it around two poles, expecting to hold the old pole if anything unusual should happen.

Never stand on a pole or guy stub while the guy stand is being pulled.

Use only properly designated tools for pole work. Do not expect makeshift tools to be safe.

▼ ▼

Preventive Maintenance in Telephone Work

BY W. R. CORRELL

Wire Chief, Inter-Mountain Telephone Co., Bristol, Tenn.

By practicing preventive maintenance we kill the germ that would soon develop into a real case of trouble, cause interruptions in service, complaints from subscribers and, in many cases, create unsatisfactory public relations before the trouble has been corrected.

On switchboards maintenance for the prevention of possible troubles is accomplished by making routine tests of all cord and trunk circuits—checking the continuity of the circuits and testing for scratchy cords, worn and burned plugs. In performing this kind of maintenance, we find the weak places much earlier and are able to make necessary repairs before they reach the stage when they will cause more than a reasonable expectancy of trouble. At prescribed intervals, depending upon the traffic, the jacks are checked and the worn ones replaced.

Rigid inspections and maintenance of the cable plant are most important. Many things may happen to a cable sheath that would cause a break, allowing moisture to enter which, if allowed to remain unattended, would cause a total failure during wet weather. These failures can be avoided to a great degree by carrying on preventive maintenance through the checking of cables periodically and systematically, cutting out those portions that show crystallization, using grade clamps, where cable is crawling, cutting out the slack and leveling the cable up.

One break in a cable often means interruptions of service on many lines for a period of from one to 48 hours. Such troubles are frequently difficult to locate promptly, especially in bad weather and, as a result of delay, become a fertile source of criticism of the service.

Open routes, both local and toll, by

the very nature of their construction and exposure lend themselves exceptionally well to profitable prohibitory maintenance. Poles are checked for decay and weak ones replaced. Guys that have given are reset and poles are pulled back.

Open wires are carefully inspected for bad joints. These should be cut out, slack pulled, all broken insulators replaced, and a good job of tree trimming, by all means, should be done. When tree trimming privileges can not be secured, then the use of tree wire will be found most helpful in preventing shorts and grounds and maintaining uninterrupted service.

Careful thought and diligent attention to one's open routes will eliminate most of the causes and practically all troubles usually associated with this type of outside plant.

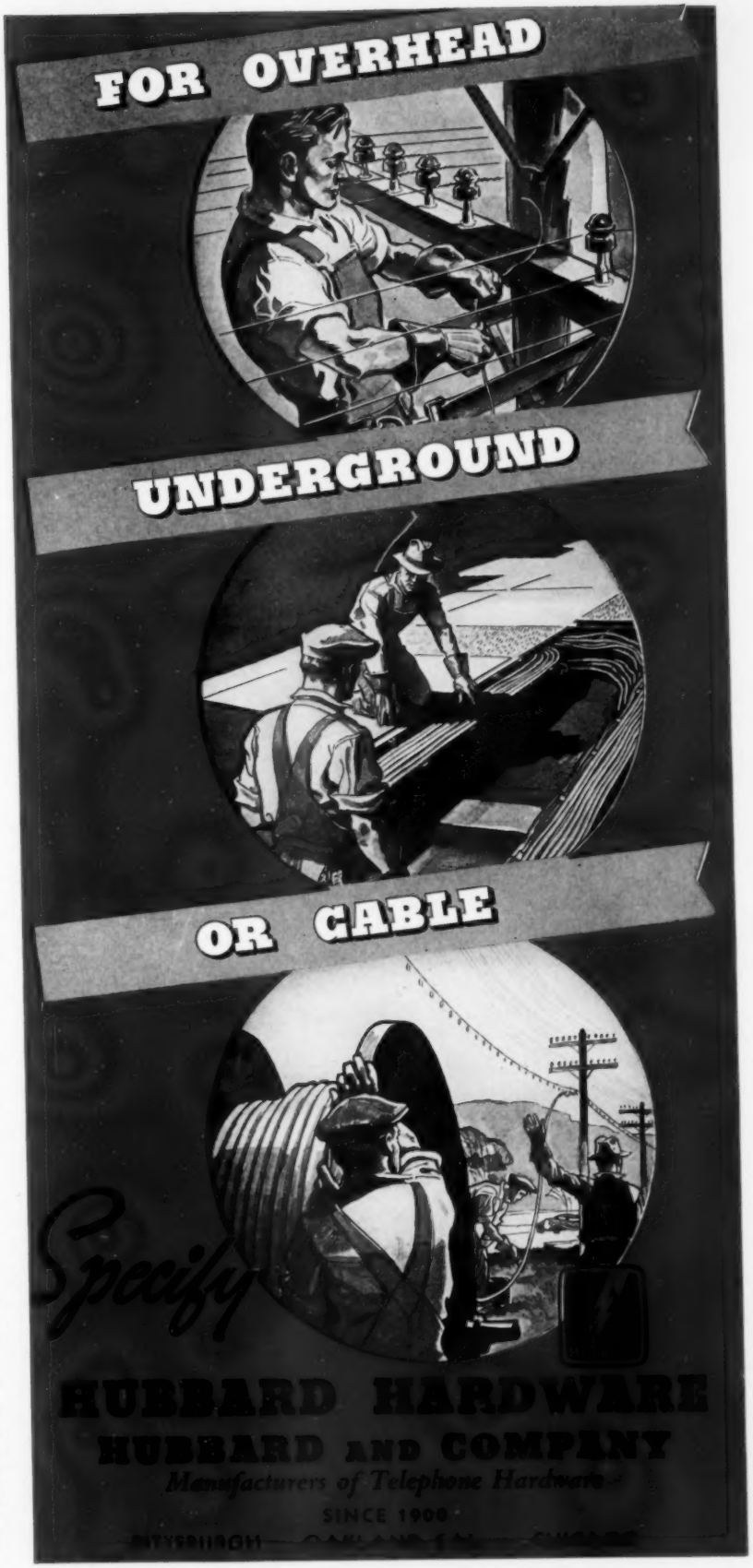
Much thought should be given and much time spent on precautionary maintenance of drops and block wires. They should be kept clear of trees or other resistants that will rub and fray the braiding, thus shortening their uninterrupted service life. If drop wires are found in or too near trees, and the trees cannot be trimmed, then they should be rearranged. If they are beginning to fray or age and show signs of causing trouble, replace them.

Maintenance work, carried on as a barrier to service failures, is also essential in station installations. The protectors which frequently cause cutoffs should be checked for loose fuses and connections. The station wire should be neatly and securely tacked for stability, as well as appearance. If allowed to swing loosely, the wire will soon break, leaving only the braiding to hold it in place, with a case of trouble difficult to locate.

The instruments should be checked for ringing, talking and receiving. Often a receiver cap will become loose, causing the receiver diaphragm to fail in its proper function. The transmitter will pack; the ringer or bells will become loose; and various other things may happen to a telephone.

The subscriber, not realizing the important relationship of any one of these parts to the rendering of good service, will not report such conditions, and they are allowed to continue until they become so bad that satisfactory use of the telephone is impossible.

The limited service the subscriber gets while an instrument is in this condition is not the high type service we would want them to have. In order that all of our subscribers may receive the fine quality of service, which is the pride and joy of any telephone operator, maintenance of the preventive type is the answer without doubt.



Commission and Court Activities

FCC Refuses to Invite Congressional Investigation

The Federal Communications Commission on April 13 rejected by a vote of 5 to 2 a resolution by Commissioner George H. Payne inviting a Congressional investigation of the commission.

Voting for the resolution were Commissioners Payne and Craven, while Chairman McNinch and Commissioners Sykes, Brown, Case and Walker voted against the resolution.

In a sharply-worded statement explaining his vote against the resolution and which was concurred in by Chairman McNinch, Commissioners Sykes, Brown and Case, Commissioner Walker said:

"Whether an investigation of a governmental agency created by Congress should be made is wholly a matter for the judgment of the Congress itself. This commission should neither advocate nor oppose such an investigation. If at any time the Congress should see fit to enter upon an investigation in which this commission should be concerned or by which it may be affected, this commission should expect to offer every facility at its command in assisting in the active prosecution of such an investigation and in making immediately available all the facts pertaining thereto."

In a formal statement assailing the commission and singling out Commissioner Walker for criticism, Commissioner Payne said:

"I greatly regret that the commission should have put itself on record as unwilling to say that it was not opposed to an investigation. In view of the language of the resolution which was drawn by me with great care, the only logical deduction is that some members of the FCC do not want the investigation and do not welcome it. It is preposterous to deny that there has been opposition to a Congressional investigation within the commission. There has even been lobbying against such an inquiry.

I am particularly amazed at Commissioner Walker's attitude in view of the fact that he formally called the attention of the commission to a leak on the American Telephone & Telegraph investigation report. This leak it would seem, was in part responsible for the fact that the A. T. & T. securities led the stock market downward during February and March, assisting in producing a crash that brought suffering to thousands and constituting a most disgraceful incident in the history of stock manipulation.

In the slight investigation that I have been able to make up to date, I have been informed that during this period one block of 7000 shares of A. T. & T. stock was offered at a half point below the market. Under these circumstances it appears to me that Commissioner Walker should have issued not an excuse for voting against the resolution but a demand of Congress that there should be such an investigation."

The resolution which was offered the previous week by Mr. Payne and tabled until April 13, was as follows:

"Whereas there have appeared in print representations that this commission or members thereof are opposed to an investigation by Congress, and

Whereas the members of this commission neither fear an investigation nor wish to see it blocked, and

Whereas the recent proposal of the commission to conduct an investigation of its own has been criticized as an effort to forestall Congressional inquiry and as an attempt to investigate itself, therefore be it

Resolved that the chairman of the rules committee of the House of Representatives be notified that this commission is not only not opposed to such a Congressional inquiry, but welcomes it both as to the entire subject of communications and the commission itself."

▼ ▼

Bell to Eliminate Handset Rate in Colorado

The 15-cent monthly surcharge on handset telephones will be eliminated after June 1 in Colorado exchanges of the Mountain States Telephone & Telegraph Co., outside of Denver and other home-rule cities, it was announced April 7 following an agreement between the company and the Colorado Public Util-

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ities Commission. The stipulation did not apply in Denver because the state commission has no authority over rates there, but officials of the telephone company assured Mayor Stapleton that the handset charge would be abolished in Denver along with the other cities.

In the past, the extra charge of 15 cents a month had been assessed against all users of handset telephones for 18 months folowing the installation. The surcharge was in addition to a $1.50 charge for putting in the instruments.

On April 1, there were 49,673 users of these cradle-type telephones in Denver, according to information furnished by the company. Outside of Denver there are now 37,242 subscribers for these instruments.

No estimate on the loss in revenue as a result of the order could be given without a complete check-up of their books, officials said, since the surcharge only applied until $2.70 had been paid.

Present users of cradle telephones will be obliged to pay the extra 15 cents a month only until the surcharge equals the installation charge of $1.50, it was announced.

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Southwestern Bell Appeals Hotel Rate Order

The Southwestern Bell Telephone Co. appealed to Second Division Circuit Court at Little Rock, Ark., April 4, from an order of the Arkansas State Utilities Commission limiting to five cents the amount a hotel may charge for local calls.

The commission's order, issued February 21, effected rate schedule changes calculated to save hotels in the state about $7,700 annually (TELEPHONY of March 12, page 40). Rates on telephones in hotel rooms and on trunk circuits connecting the hotel switchboard with the central station were reduced and rates on PBX switchboards were increased.

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Wisconsin Bell Files Exceptions with NLRB

Attorneys for the Wisconsin Telephone Co. on April 15 filed with the National Labor Relations Board in Washington 38 exceptions to the findings, conclusions and recommendations of Examiner James C. Batten who held the utility guilty of unfair labor practices in a report filed April 6.

Examiner Batten's findings of fact were attacked in 28 of the exceptions as "not established or supported by the evidence." The attorneys of the Wisconsin company took exception to his conclusions on the ground that they are "contrary to law, and not sup-

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ported or justified by the evidence." The company excepts to the examiner's recommendations as "improper and unwarranted" in addition to the findings of fact and conclusions upon which they were based as being "not established or supported by the evidence and are contrary to law."

The intermediate report filed by Examiner Batten with the labor board found the telephone company guilty of dominating an independent union of telephone operators in its exchanges. Charges of unfair labor practices were filed against the firm by the AFL brotherhood of electrical workers.

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Indiana Bell Asks Statewide Rate Basis

The Indiana Bell Telephone Co. filed a new petition with the Indiana Public Service Commission April 9 asking that a rate investigation be made on a statewide basis and that net earnings be kept at the 1937 level. Filed to replace an earlier petition withdrawn, following a commission hearing April 6, the new request does not ask for a general rate increase. Company representatives told the commission they wish to have the new rates made on a statewide instead of a local basis.

Sixteen petitions asking for rate reductions have been filed by patrons of various municipalities and are pending before the commission. The company's new request does not ask specifically for a combination of these 16 cases but only that a statewide investigation be made. Under the law the commission has discretionary power to determine whether rates, which are fixed on property valuations, shall be made on a state or local basis.

The company now is operating under rates fixed by an order in 1926, which was made on a statewide basis. Pointing out that it has 81 exchanges and about 215,000 subscriber stations, the company said that net earnings during 1937 were less than 5½ per cent on the cost of the property and that the 1938 percentage is expected to be less.

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Rural Rates Increased Due to Electrification

The Nebraska State Railway Commission has authorized the Nebraska Central Telephone Co., of which D. E. McGregor, president of the state telephone association is head, to charge a net rate of $1.90 a month for metallic service at its Gibbon and Shelton exchanges.

The rural area served by the company is to be gridironed with rural electrification lines built by the Buffalo County Public Power Project, which has a large government loan and which has received permission to proceed with construction, and this makes necessary the metallicizing of all telephone circuits.

The company has heretofore been charging $1.50 for grounded service and, in the small area where metallic service was given, $1.65 a month. It asked for a flat rate of $2 net for all rural metallic service, but the commission decided that while the showing made justified a considerable increase, $1.90 would be a proper rate.

The work of changing from one to two-wire circuits is to be begun shortly. The company took the position that rates should take care of such costs where reconstruction was forced by rural electrification projects.

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Mileage Charge and Base Rate Area

The Nebraska State Railway Commission has taken under advisement a complaint filed by residents of Lakeview, a suburb separated from the city of Lincoln by a half-mile of salt marshes, who wanted the Lincoln Telephone & Telegraph Co. ordered to extend its base rate area so as to take in their community.

The request was based largely on the claim that they were being charged a 50-cent mileage rate in addition to the Lincoln rates, whereas they were closer to the exchange than many Lincoln subscribers. This claim was badly shaken when the company introduced testimony to show that the more distant Lincoln subscribers were served by suburban exchanges and not from the main exchange, from which the complainants measured the distance. The Lakeview community is unincorporated, and gets city water service only upon payment of an extra service charge.

The company relied upon an extensive survey made by the commission in 1925 of all suburban communities, which was followed by an order fixing the present base rate area limits. In that the commission said that any line drawn would create some injustices, but that such divisions of service territory were necessry to preserve a balance in rates charged.

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Asks Rate Increase Following Storm Damage

At a special meeting of the directors of the Hamilton County Telephone Association of Nebraska it was voted to ask the Nebraska State Railway Commission for authority for an immediate increase in rates. This was made necessary, Manager D. M. Davis says, because of heavy losses from sleet storms the first week in April. Damages will run from eight to ten thousand dollars, he says.

The company asks for an increase of 15 cents a month on all residence and rural service, 50 cents a month on business service at its Aurora exchange and 25 cents a month for business service on its exchanges at Doniphan, Giltner, Hampton, Hordville, Marquette, Phillips, Stocham and Trumbull. The association is operated on a cost-of-service basis rate, and has an exchange in every county town.

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Summary of Commission Rulings and Hearings

Federal Communications Commission, Washington, D. C.

March 31: The General Telephone Corp., of New York City, has been granted an extension of time until April 15 in which to file the Annual Report Form H for the year ended December 31, 1937, with the understanding that every effort will be made hereafter to file the report prior to that date if practicable.

March 31: An extension of time granted to the Nebraska Continental Telephone Corp., of Columbus, Neb., until April 30, in which to file the Annual Report Form M for the year ended December 31, 1937, with the understanding that every effort will be made in the future to file the report in advance of that date if practicable.

April 5: The Champaign Telephone Co., of Urbana, Ohio, has been granted authority to file brief in support of the respondent's exceptions to Examiner's Report III-4 and supplement, Docket No. 3754.

April 5: J. J. Becker has been granted authority under Section 212 of the Act and the orders of the commission, to hold positions as vice-president of the Cincinnati & Suburban Bell Telephone Co. and director of the Citizens Telephone Co.

Arkansas State Utilities Commission

March 31: Applications filed by the Southwestern States Telephone Co. of Cabot, the Southwest Telephone Co. of Alma and the Southwest Telephone Co. of Hazen asking for authority to increase rates for commercial and residential service.

Idaho Public Utilities Commission

April 14: Hearing on citation against the Pacific Telephone & Telegraph Co. to show cause why the charge of 15 cents per month for handset telephones and a connection charge of $1.50 should not be eliminated.

April 15: Hearing on petition of the Pacific Telephone & Telegraph Co., which seeks a substantial increase in service charges in Lewiston.

April 11: Hearing in Coeur d'Alene on the commission's citation against the Interstate Telephone Co., of Spokane, Wash., to show cause why the extra monthly charge for handset telephones should not be eliminated.

The company serves 7,721 subscribers in Idaho, including Coeur d'Alene, Moscow, Wallace, Kellog and other Idaho towns.

An extra charge of 25 cents for the handset type instrument is made on residential telephones according to C. E. Hoy, superintendent of the Interstate company, but the charge is not made on business telephones.

Illinois Commerce Commission

April 19: Hearing in Springfield on the application of the Crossville Telephone Co. for authority to increase its rates in Crossville.

April 20: Hearing in Springfield on the commission's citation, on its own motion, against the Illinois Bell Telephone Co. to show cause why an order should not be entered requiring it to construct and install telephone facilities and render service in River Oaks, West Cottage Hills, North Cottage Hills, South Cottage Hills and Fairfield subdivisions and territory adjacent thereto in Fosterburg Township, Madison County.

April 20: Hearing in Springfield on citation against the Illinois Central Telephone Co. and the Peoples Telephone & Telegraph Co. of Menard County to show cause why they should not furnish telephone service to subscribers of the Sweetwater Telephone Co. which desires to discontinue operation of its exchange at Sweetwater.

Indiana Public Service Commission

May 10: Hearing on petition of Indiana Bell Telephone Co. for a statewide investigation of rates.

Nebraska State Railway Commission

April 13: Order issued directing accounting department, in cooperation with telephone companies, the Nebraska Telephone Association and other parties at interest, to prepare and submit at an early date a revised system of accounting for all telephone companies having average annual revenues of less than $50,000, to be substituted for existing order dated February 11, 1919.

April 13: Application filed by Hamilton County Farmers Telephone Association asking for increase of 15 cents a month on all rural and residence service, and 25 cents a month on business service at all exchanges except Aurora, where 50 cents a month increase is asked.

April 13: In the matter of the application of the Odell Independent Telephone Co. for authority to charge $1.75 a month for metallic residence service, $1.50 net; found reasonable and granted as asked.

April 13: In the matter of the application of the Lincoln Telephone & Telegraph Co. for authority to eliminate service to former Saronville subscribers now attached to Harvard exchange; found reasonable and granted as asked.

April 13: In the matter of the application of the Lincoln Telephone & Telegraph Co. for authority to cancel grounded rates on Auburn exchange; it appearing that this service is no longer demanded or given, granted as asked.

April 15: In the matter of the application of the Lincoln Telephone & Telegraph Co. for authority to eliminate obsolete service at McCool exchange; granted as asked.

New York Public Service Commission

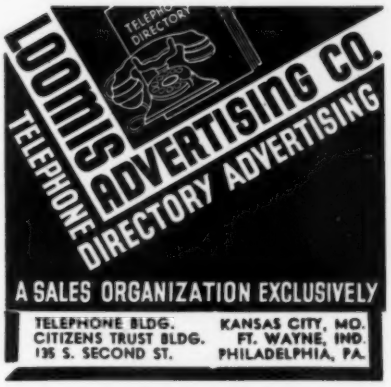
April 21: Hearing in New York before Commissioner Brewster on the rates of the New York Telephone Co. for telephone service rendered to and through hotels.

Ohio Public Utilities Commission

April 15: Admonishing the defendant company that it at all times must provide and maintain adequate facilities for the furnishing of adequate and efficient service between its exchanges at Lewis Center and Delaware, the commission dismissed the complaint of Clyde H. Hooley et al., R.F.D. Delaware, that the Northern Ohio Telephone Co. proposed transferring them from the Delaware to the Lewis Center exchange.

Oklahoma Corporation Commission

April 13: Increased rates for the Atoka exchange of the Southwestern Bell Telephone Co., authorized in Cause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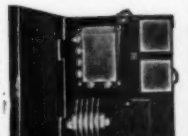

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